



THE  
**MANVALL**

of the Anatomy or dissection  
of the body of Man.

*which usually are shew'd in the public  
Anatomical exercises.*

*Methodically digested into 6 Books*  
by Alexander Read, D: of Physic.

London Printed for Francis Constable  
and are to be sold at the signe of the Goat in  
Kings street. or at Westminster Hall.

1649





THE  
MANVALL  
OF THE  
ANATOMY,  
OR,  
DISSECTION  
OF THE  
BODY OF MAN.

Containing the enumeration, and  
description of the parts of the same, which  
usually are shewed in the publick Ana-  
tomicall exercises.

Enlarged this present year 1642. and more  
Methodically digested into 6. books.

With sundry figures thereunto belonging.

By *Alexander Read*, Doctor of Physick,  
a Fellow of the Physicians Colledge  
of *London*, and a Brother of the wor-  
shipfull Company of the Bar-  
ber-Chirurgions.

---

L O N D O N,  
Printed by *R. Bishop*, for *Francis Constable*,  
and are to be sold at the Goat in Kings  
Street, or at his shop in *Westminster-*  
*Hall*, Anno 1642.

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C A R O L O

Magnæ Britannicæ

Monarchæ Hibernicæq;

ac Gallæ Regi poten-

tissimo fausta omnia

precor.



*N* offero Majestati  
vestræ lucubration-  
culas istas Anatomicas:  
Munus fateor  
te minimè dignum, quem De-  
us ad supremum ferè honoris in-  
terris culmen evexit. Nihilo-  
minus si omnia justo trutinæ  
examine pensentur, quivis æ-  
quus arbiter pronuntiabit eas  
ad te properare debere. Cogi-  
taverat pridem apud se Maje-  
stas vestra quàm utile, imo ne-

## Epistola Dedicatoria.

cessarium huic Reipublicæ sit multos habere peritos Chirur-  
gos, siue Pax alma floreat, siue  
Bellum ingruat. Quapropter  
ea sanxit, ut doctus aliquis ac  
peritus Medicus communionis  
hujus fratribus ex suggestu,  
singulis diebus Martis, huic ex-  
ercitio destinatis, præcepta ar-  
tis traderet ab auditoribus exci-  
pienda, atque Anatomicis disse-  
ctionibus temporibus constitutis  
præset. Quum ea munia mihi  
obeunda ante aliquot annos  
commissa fuissent, animadverti  
illorum in rebus Anatomicis pro-  
fectum mirè tardatum, quod nul-  
lum haberent compendium Ana-  
tomicum, lingua vulgari emis-  
sum. Vt huic desiderio occurre-  
rem compendiolum tale in lucem  
emisi, ex cuius lectione tyrones  
fructum aliquem percepere. Ve-  
rum quæ proficientibus visum  
fuisse

## Epistola Dedicatoria.

fuisse nimis jejunum sumpsi  
id iterum in manus, ac copio-  
sius de humani corporis parti-  
bus disserui. Quum itaque se-  
cunda cura refectum in lucem  
emittendum sit, ad quem potius,  
quàm ad Vestram Majestatem  
tendet, quæ prima factura au-  
drix fuit? Nec est quod verear  
me audaciæ, aut inverecundiæ  
crimen incursum: Quum  
mibi securitatem promittat exi-  
mia vestra comitas atque affa-  
bilis erga omnes, quæ om-  
nium amorem conciliant, ut  
dignitas regia timorem. Quæ  
duo Sceptra Regibus fir-  
mant. Vnum hoc opella hu-  
ic ex hac Dedicatione pro-  
mittere possum: Eam gra-  
tiores omnibus futuram, quod  
tanti ac talis Regis nomen  
sibi præscripserit. Scribebam  
Londini 4. Calend. Octob.

**Epistola Dedicatoria.**

*Anni ab exhibitō in carne  
Messiah, supra millesimum  
sexcentesium tricesimi sep-  
timi.*

**Vestræ Majestatis  
cultor humillimus,**

**ALEXANDER REIDUS  
Scoto-Britannus.**

**To**

*manus*

## To the Reader.

Courteous Reader.

**N**ow I present to thee the  
third Edition of the Ma-  
nuall of Anatomie,  
which shall be the last  
that shall bee publised in my life  
time, which is not farre from its  
period. The Houre-glasse hasten-  
eth, and but few sands remaine un-  
runne. The booke of the Breast, and  
the booke of the Braine are altoge-  
ther new, as the booke also of the  
Bones. In this Edition allthings are  
set downe more fully, methodically,  
and correctly, than in the former. If  
it give thee contentment, and fur-  
ther thy proceedings, I have obtain-  
ed that which I aimed at: for I ex-  
pected no other reward of my la-  
bours. I have endeavoured to set  
downe allthings as plainly and short-  
ly as I could, attemperating my selfe  
to the capacity of those, who begin to  
addit their minds to this study. I  
am not so in love with my owne la-

To the Reader.

bours, as to thinke that they can profit such as have made a reasonable progresse in it. Howsoever, it will serve any one in stead of an Index, to present brtely unto the mind those things which they may find set down at large, in the ample discourses of learned Anatomists, as well Ancient as Moderne. Make then of it what use thou shalt thinke fittest, and wish well to the Author, who hath endeavoured to ease thee of some paines, which thou must have taken to have contrived such a compend as this is, of the description of the parts of the body of man.

Vale.

The



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Fig. 1.

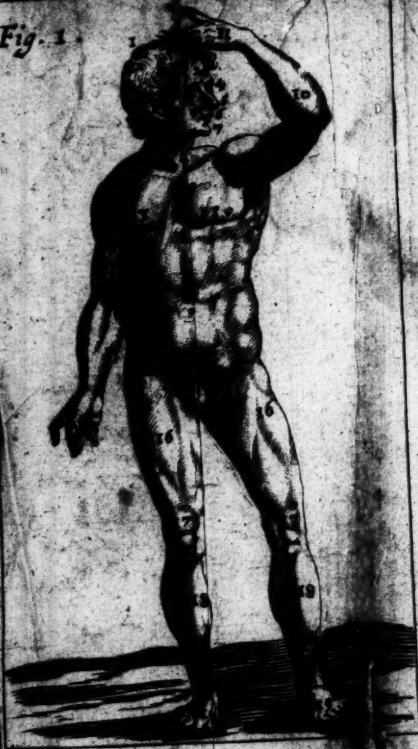


Fig. II.





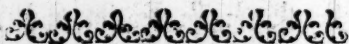
The explication of the  
first figure.

1 The hairy scalp. 2 The forehead. 3 The eare. 4 The eyes. 5 The nose. 6 The mouth. 7 The chin. 8 The temple. 9 The cheek. 10 The arme. 11 The hand. 12 The breast. 13 The sides. 14 The belly. 15 The genitals. 16 The thighs. 17 The knees. 18 The legs. 19 The feet.

The explication of the  
second figure.

1 The back part of the head. 2 The shoulder. 3 The elbow. 4 The back. 5 The buttocks. 6 The hams. 7 The calves of the legs. 8 The ankles. 9 The insteps. 10 The heels.

These two figures are to be placed  
between the Epistle to the Reader  
and the first Chapter.



## The Number and Contents of the B O O K S.

**T**He first Booke containeth the description of the parts of the belly, and hath 27 Chapters.

The second Booke containeth the description of the parts of the breast, and hath 12 Chapters.

The third Booke describeth the head, and hath 26 Chapters.

The fourth setteth downe the veines, arteries, and sinewes of the limbs, and hath 7 Chapters.

The fifth Booke describeth the muscles of the whole body, and hath 31 Chapters.

The sixth setteth downe the bones, and hath 28 Chapters.

THE



THE  
FIRST BOOK  
of the lower cavity  
called Abdomen.

CAP. I.

*Of the division of the parts of the  
body of man in generall.*



Natomy is an artific-  
all separation of the  
parts of the body by  
section, practised to at-  
tain to the knowledge of the frame  
of it, and the use of each part. In  
Anatomical exercises, first the  
whole carcasse doth offer it selfe,  
then the parts.

The whole hath foure Regions,  
to wit, the fore and backe parts,  
and

The de-  
scription  
of Anato-  
my.

The regi-  
ons of the  
whole.

What the  
whole and  
a part sig-  
nific.

Things re-  
quired in  
a part be-  
ing strictly  
taken,

1.

2.

3.

4.

5.

6.

and the laterall, which are the right and left.

I call the whole that which containeth the parts, and a part that which is contained in the whole, according to the most ample acceptance of the terme part; for in a more strict acceptation a part is a body solid, cohering with the whole, endued with life, and framed to performe some function.

A part then must be solid: the humours then cannot be numbred amongst the parts, because they are fluid.

Secondly, it must have life: and so the extremities of haire and nailes are not to bee accounted parts.

Thirdly, one part must not nourish another: and so the bloud, fat, and spirits, are not parts.

Fourthly, it must have a circumscription.

Fifthly, it must be united with the whole.

Sixthly, it must have some action and use.

The

The principall differences of parts are taken either from their nature or functions. From their nature, parts are said to be either similiary or dissimiliary.

The differences of parts.

A similiary part is that whose particles are of the same substance and denomination with the whole: as every portion of a bone is a bone. It is otherwise called a simple part.

What a similiary part is.

Of simple parts there are ten in number, to wit, the skin, a membrane, the flesh, a fiber, a vein, an artery, a nerve, a ligament, a cartilage, a bone: they are comprehended in these two verses.

The number of simple parts.

*Cartilago, caro, membrana, arteria, nervus,*

*Vena, ligamentum, cutis, os, lentissima fibra.*

To these a tendon, which is the principall part of a muscle, may be added; for the substance of it is simple, without any composition.

Of a tendon.

Of

The differences of simple parts.

Of the former simple parts, some are simple indeed, and these are in number seven; the skin, a membrane, the flesh, a fibre, a cartilage, a bone. The rest are onely simple to the eye or sense, and not to reason; for a nerve (for example) is composed of many filaments, covered with a membrane.

What a dissimilary part is.

A dissimilary part is that whose portions are neither of the same substance, nor the same denomination, as a muscle, in the which are flesh, a nerve, and a tendon. It is otherwise called a compound part, and an organical part.

Things to be observed in an organical part.

In an organical part foure particles are found; First, the chiefe particle, as the christallin humour in the eye.

1

Secondly, that particle, without the which the action cannot bee performed, as the optick nerve.

3

Thirdly, that which furthereth the action, as are the membranes and muscles.

4

Fourthly, that by the which the



the action is preserved, as the eyelids.

Of organically parts there are four degrees.

The first is made only of the similars, as a muscle.

The second receiveth the first kind of organically parts, and other similars, as a finger.

The third admitteth those of the second degree, as the hand.

The fourth is made of the third and other parts, as the arme.

Parts from their function are said to be either sustaining or sustained. The bones sustaine the frame of the whole body, the rest are sustained. Now these are the cavities or the limbs.

The degrees of an organically part.

1

2

3

4

The differences of parts taken from their function.

C A P. II.

*Of the circumscription, regions, substance, and parts of the Abdomen.*

**O**F all the parts of the body which are sustained, we are

to begin dissection with the cavities; First, because they offer themselves to the view in the fore region of the body.

Secondly, because they being moist, and apt to receive the impression of the externall heat, soonest putrefie, and send out noisome smells. The cavities are appointed to receive the principall parts, and those which minister unto them. Wherefore there are three cavities, according to the number of the principall parts. The head is for the braine, the breast is for the heart, and the belly for the liver. And because this cavity is most subject to putrefaction, you are to begin at it. Now foure things concerning it offer themselves. First, the circumscription, or bounding of it. Secondly, the regions of it. Thirdly, the substance of it. Fourthly, the speciall parts of it.

As concerning the circumscription of it, it is severed from the breast by the midrise. It is bounded above

above by the *cartilago ensiformis*, and beneath by the share bones.

The regions of it are three, the uppermost, middlemost, and lowermost. The uppermost, which is bounded between the *mucronata cartilago*, and three inches above the navell, about the ending of the short ribs, hath three parts: The laterall, which are called *hypochondria*, or *subcartilaginea*, because they lie under the cartilages of the short ribs. In the right *hypochondrium* lieth the greatest part of the liver, but in the left the spleene, and greatest part of the stomach. The third part is that which before lieth between the two laterall parts, and is properly called *epigastrium*, because the stomach lieth under it. In this part remarkable is the pit of the breast, which is called *xagdia*, or *scrobiculus cordis*, by the moderne Writers. The middlemost part extendeth it selfe from three inches above the navel, to three inches under it. The fore part is where the navell is, from whence

whence it is called *regio umbilicalis*. The two laterall parts have no proper denominations. In the right are contained *intestinum cæcum*, with part of *Colon*. In the left part of it, a portion of *Jejunum*, and the rest of *Colon*. The rest of *Jejunum* is under the navell. The navell in man is wrinkled, as the forehead of an aged woman; but in other creatures it is onely a hard knot without haire, having no wrinkle. It hath no laterall parts, having no proper names; although *Laurentius lib. 6. Histor. Anatom.* affirmeth it to have, and gives them names; in this region is contained the whole hungry gut.

3  
The lower  
region.

The lower region is called *ὑποχονδρια*: This region hath three parts, the laterall, and the middlemost: The laterall, which reach to the *hypochondria*, are called *λαγῶνες*, because they are the seat of lust, which is called *λασχεία*. By *Hippocrates* they are termed *μεσάνητες*, because they being placed between the hanch-bones, and ribs, are

are lanke, and seeme to contain nothing. In Latine they are called *Ilia*, because the *ilium intestinum* lieth under them on every side. Besides this in the right part are placed portions of the *Colon*, & *cæcum intestinum*, which are tyed together. In the left part are contained a great part of the *Colon*, and the *intestinum rectum*.

*Ilia.*

The fore part of the *hypogastrium* by *Aristot. lib. 1, Hist. animal. 3.* is called *ἡγαστρον*, which *Gaza* calleth Abdomen and Sumen. Under it lieth the *pubes*, which word signifieth both the haire, and the place where the haire grow, which appeare to bud in girles the twelfth yeare, but in boyes the fourteenth yeare, when way is made for the monethly courses and seed, the skin being there made thinner, the heat encreasing in them. At the sides of the *pubes* appeare *Cucures*, or *inguina*, the groines. Under this middle region are contained the bladder, the *intestinum rectum*, and the matrix in women.

*Inguina.*

The

The hindermost parts.

The hindermost parts are called *lumbi*, the loines, and they reach from the bending of the back to the buttocks, called *nates*, *ab innitendo*, because when we sit, we rest upon them. The fleshy part on each side is called *quæ*, *ἀπὸ τῆς παύσεως*, *à palpando*, from culling or clapping. In the right loyne, the right kidney; but in the left, the left kidney is contained.

### CAP. III.

*Of the common containing parts of the belly.*

**T**He common containing parts of the belly are soure, the skarf-skin, the skin, the fat, and the *membrana carnosæ*.

The skin in man is called *cutis*, but in beasts *aluta*; in Greek it is called *ἄρπη*, and *ἄρπη*; either *ἀπὸ τῆς ἀρπάζου*, because it is easily fled off; or from *ἄρπη*, seeing it is the end and superficies of the whole body: Of all the membrane

of

of the body it is the thickest.

It hath a double substance; the one is externall, called *ἐπιδερμὶς* *ἐπὶ δὲ τὸ δέρμα τῆς*, because it is placed upon the skin as a cover, but is termed *cuticula* in Latin; for it is as large as the skin, and more compact; for watrish sharp humours, passing through the skin, are stayed by the thicknesse of this, and so pustules are caused. In man it is as the peelings of onions. It is without blood, and without feeling.

*Cuticula.*

Three causes concur to the generation of it; to wit, the materiall cause is a viscus and oleous vapour of the blood. The internall efficient cause, the naturall heat of the subjacent parts raising it up. The externall efficient cause is the externall coldnesse, partly of the aire, partly of the skin it self: It is engendered even as the thin skin in milk, and fat broths: It is hardly separate from the skin with a knife; but easily in living creatures by a vesicatory, and in dead persons by

by fire, or scalding hot water.

1 The use of it is to defend the skin, which is of an exquisite sense, from externall immoderate, either heat or cold. In cold weather it breaketh the cold, that the perspiration should not bee altogether hindered: In hot weather by its compactnesse it hindereth too great perspiration.

Secondly, to be a middle between the skin, and the object of feeling.

Thirdly, to stay the ichorous substance from issuing from the veines and arteries; for this we see when the *cuticula* is rubbed off by any meanes.

2 The true skin is six times thicker than the skarfe skin: in children, women, and those which are borne in hot countreyes, it is thinner; but in men, and in those who inhabit cold countreyes, it is thicker.

The Negroes become black, because they having a softer skin, and large pores and loose, many vapours



pours of the aduſt humours, which are raiſed with the ſweat; the groſſer ſubſtance whereof, by reaſon of the exceſſive heat, being dried and burned, cauſed the blackneſſe of the ſkin; for their infants are not borne blacke, but reddiſh; and they afterwards become blacke, the *cuticula* growing in them as in us.

The ſkin in the forehead and ſides it is thin, thinner yet in the palme of the hand, but thinneſt of all in the lips and cods. In the head, back, and under the heele it is thickeſt. Under the heele the *cuticula* in ſome will be as thick as a barley corne.

The pores will appeare in the ſkin in the winter time, it being bared; for where they are, the *cuticula* will appeare as a Goofes-kin.

The ſkin hath an action, to wit, the ſenſe of feeling.

*Pinguedo, πικέλιον, eſt humor oleoſus noſtri corporis à calore moderato ſubjectarum illi partium elevatus, ac inter membranam carnoſam ac*  
*cuticula*

3. Of fat.

Its kinds.

*cutem concrefcens, qua partes funt  
denfiores ac frigidiores. Ejus dua funt  
fpecies, axungia, μίλην, & ſevum  
five ſiāp.*

They differ; for firſt, *axungia* is in beaſts not horned, which are full toothed; but *ſevum* in beaſts not horned, which are not full toothed.

Secondly, *axungia* is eaſily melted, but not ſo eaſily congealed; but *ſevum* is not eaſily melted, but is eaſily congealed.

Thirdly, greaſe is not brittle, but tallow is. The fat under the ſkin is greaſe, but in the caule, kidneyes, the heart, the eyes, and about the joynts, it is tallow.

The uſes of it are theſe: Firſt, it defendeth the body from the aire; ſo Apothecaries, when they mean to preſerve juices, they poure oile upon them.

Secondly, it preſerveth the naturall heat.

Thirdly, it furthereth beauty by filling up the wrinkles of the ſkin.

Fourthly,

Fourthly, in the muscles it filleth up the empty places, it is under the vessels that they may passe safely; in the intrals it helpeth concoction, in the buttocks it is as down in a pillow.

*Membrana carnosæ*, or *νῆμα σαρκώδες*, so called in man, not that it is in him fleshy, but nervous, and so *nervea*; but because in beasts, which the Ancients used most commonly to dissect, it is endued with fleshy fibres; in the birth it is red, but in those of ripe age white; in the forehead and neck it is more fleshy. Within it is bedewed with a viscuous humour, to further their motion, by keeping the superficies of them, from desiccation, which otherwise might fall out by reason of their motion. It is of an exquisite sense, whereof when it is pricked with sharp humours, it causeth grooving: such as are felt in the beginning of ague fits. First, it preserveth the heat of the internal parts. Secondly, it furthereth the gathering

4  
*Membrana carnosæ.*

Its uses.

B                      thering

thering of the fat. Thirdly, it strengtheneth the vessels which passe between it and the skin.

#### CAP. IV.

*Of the proper containing parts.*

**T**He proper containing parts are the muscles of the belly, and the *peritoneum*. Of the muscles we have spoken elsewhere, *Chap. 17.*

*Pernonaum* is tied above to the midrise, below to the share and flanke bones; in the forepart firmly to the transverse muscles, but chiefly to their tendons about the *linea alba*; behind to the fleshy heads of these muscles loosely, and the membrane of the nerves, which come from the *vertebra* of the loynes. The end of this firm connexion is to presse equally the belly, for the expulsion of the ordure and breathing. If this connexion had not beene, the *peritoneum* would

would have become wrinkled, the muscles being contracted. If it had not beene loose tyed to the fleshy parts, the contraction of them in the compression of the belly had been hindered.

As for the proceeding of it, *Fallopian* will have it to proceed from a strong twisting of sinewes, from whence the *mesenterium* hath its beginning. Some will have it to proceed from the ligaments, by the which the *vertebrae* of the loines, and the *os sacrum* are tyed together.

*Picolhomineus* will have them to be framed of these nerves, which spring out of the *spinalis medulla*, about the first and third *vertebrae* of the loynes, which are tyed together by both the meninges, when they march further: Here it is very thick, because it was to be much extended.

It is double every where, but chiefly about the *vertebrae* of the loynes, where betweene the duplications lie the *vena cava*, the *aorta*,

and the kidneyes. In the *hypogastrium* two tunicles are apparently seen, between which the bladder and matrix lie. All the parts which receive nourishment from the *vena cava*, are seated between the coats, as the afore named parts; but those which receive nourishment from the *vena porta*, as are they which serve for concoction of the nourishment, are not; the umbilicall vessels also are placed in the duplicature of the *peritonaeum*, that they may march the more safely.

To the beginning of the productions of the *peritonaeum* the inner coat cleaveth firmly, and shutteth the hole, by the which the spermatick vessels passe from the lower part of the belly. If this be broken, the outer coat is relaxed, and so a rupture is caused.

The *Peritonaeum* is thickest; First, where there are manifest humours to hinder the breaking of the subjacent part, and issuing out of them, as above the stomach.

Secondly,

Secondly, where many vessels and spirits are, as above the spleen.

Thirdly, where much stretching is required, as above the bladder, matrix, and stomach.

C A P. V.

*Of the Omentum.*

**T**He parts contained serve either for nutrition, or procreation. As for the parts serving for nutrition, they either serve for chylification, or sanguification. The principall efficient cause of chylification, is the stomach; but the adjuvants are the caule, and the *pancreas*.

The principall efficient causes of sanguification, are the liver and spleen, but the other parts are the adjuvant causes. Of these some receive the excrements of the chylification, as the guts. The excrements of the sanguification are two, choler, and the watrish hu-

Of the parts contained in the lower belly.

mour. The thin choler is received by the *vesica fellea*; but the grosse choler, by the *meatus cholidochus*: The wattrish humour is turned to the kidneyes, and from thence to the bladder, by the ureters.

The parts appointed for procreation, are the genitals, both in men and women. Next then to the *Peritoneum* is the *Omentum*, or caul; in Greek it is called ἐπίπλοον, παρὰ τὸ ὀπισθίον, because it seemeth to swim above the upper guts. The *Arabians* call it *Zirbus*.

Its substance.

It is composed of two membranes. The uppermost doth spring from about the bottome of the stomach, from the common coat of it, and is tyed to the hollow part of the liver and spleen.

Its connexion.

The lowermost doth spring from the *Peritoneum*, immediately under the midrise towards the back, and is tied to the hollow part of the liver, to the midrise, to the *duodenum intestinum*, to the convex part of the spleen; and last of all, to all that part of the *Colon* which marcheth

eth



eth under the stomacke.

It hath veines onely from *porta gastroepiplois dextra & sinistra* : they are inserted into the upper membrane, but *epiplois dextra & postica* into the inferiour membrane.

Its veines.

It hath so many arteries from *ramus coeliacus*, & *mesentericus*. It hath small sinewes from the costale branch of the sixth paire. It hath much fat : if it be plentifull, and the caule reach to the *os pubis*, in women it causeth sterility, by compressing the mouth of the matrix ; in men it causeth a rupture, by relaxing the *peritoneum* : This rupture is called *epiploenterocele*.

Its arteries

Its sinews.

In figure it representeth a Faulconers pouch, according to *Galen* : The mouth is round, and the bottome is made by the two membranes joyned together. This will appear if you fill it with water, by *Galens* advice.

Its figure.  
6 De Anat.  
administ.

It is then of substance membranous, that it might admit dilata-

The reason of the frame of it.

tion and extension. It is thin, that it should not burden the subjacent parts; it is compact to hinder the dissipation of the internall heat, and to repell the externall cold.

The fat.

The fat is about the veines and arteries, to strengthen them from being compressed by the repletion of the belly, and other motions. When the stomach is full, and the guts empty, the upper membrane is raised, the lower remaining in its owne place; but if the guts be full, and the stomach empty, then the lower membrane riseth up, the upper remaining in its own place. It is tyed to the stomach, being a middle part between the colon and the spleen; and that it should not totter from side to side, It is tyed in the right side to the colon and liver; but in the left side to the spleen.

'ts beginning.

It hath its beginning from those parts unto which it is tyed, that it might receive veines and arteries from thence for bloud and life. The lower part is free and untied, that

that sometimes the upper, sometimes the lower membrane might rise up.

The uses of it are three: First, it cherisheth the internall heat of the stomack and intestines.

Secondly, it ministreth nourishment to the parts in time of famine, *Galen. de us. part. l. 4. c. 11.*

The third is to containe the humours flowing from the intestines, which the glandules cannot receive wholly at one time, *Hippoc. lib. de glandulis.*

Creatures which have no caule, help the concoction, by doubling their hinder legs, and resting their belly upon them, as Hares and Connies.

An observation.

They who have had a portion of it cut off, because it was corrupted, having fallen out by reason of a wound received in the abdomen, have afterward a weak concoction, and are enforced to cover the belly well. See *Galen. lib. 4 de us. part. 9.* where he proveth this by example.

Another.

CAP. VI.  
Of the Gula.

The marching of it

**T**He Gullet or weazand is an organically part, which beginneth about the root of the tongue, and passeth from thence directly between the wind-pipe, the *vertebra* of the neck, and the foure first *vertebra* of the brest, upon the which it resteth; but when it is come to the fifth *vertebra* of the brest, it giveth way to the trunk of the great artery descending, by turning a little to the right side: afterward accompanying the arterie to the ninth *vertebra*, there it is raised up by meanes of the membranes from the *vertebra*, and marching above the arterie, it passeth through the nervous body of the midrise, and is inserted into the left orifice of the *ventriculus*, about the eleventh *vertebra* of the brest.

The names of it,

It is properly called *σείμαλον ὄνυχον* & *μακρὸν*, quia *angustus & longus*.

*longus*: see *Aristot.* 1. *histor. animal.* 16. It is also called *δισπαίον*, *ἐν οἷς τὸ φαγνμα*, *quod cibum ad ventriculum vehat.*

It is framed of three membranes. The first is the uttermost and common compassing the two proper, which it hath either from the *peritonaeum*, according to some, or from the ligaments of the *vertebra* of the neck and brest, upon which it resteth. The second is the middlemost, and it is fleshie and thick, and hath onely transverse *fibres*. The third is the innermost, and it is membranous, and hath onely small and straight *fibres*.

It is joyned to that membrane which covereth the throat, palat, mouth, and lips; so that before vomiting, signes in the lips will appeare.

It hath veines both from the *vena cava*, and the *porta*; for it hath sprigs from *vena sine pari*, while it is yet in the brest: but where it is joyned to the ventricle, it hath some twigs from *ramus coronarius*.

Its structure.

Its connexion.

The vessels.

*rius*, which proceedeth from the *porta*.

It hath arteries from the intercostall arteries, and *ramus caliacus coronarius*.

Nerves it hath from the sixth paire, which are carried obliquely, for safety, as *Galen* noteth 6. *de usu part.* 6. and are very many; which is the cause that the parts about the upper orifice of the ventricle are so sensible,

Its Glandules.

It hath foure *Glandules*; two in the throat, which are called *Tonsilla*, or Almonds, common to the *Weazand* and the *Larynx*, which prepare the pituitous humour to moisten them: other two it hath about the middle of it, towards the back, about that place where the *aspera arteria* is divided into two branches, under which it lieth.

The use of it.

The weazand serveth as a funnell to carry meat and drink to the maw; for it receiveth them by dilating its proper internall coat, and turneth them downe by the contraction

striction of the middlemost coat,  
and the muscles of the *Pha-*  
*ryn*x.

C A P. V I I.

Of the *Ventriculus* or  
*Stomack*.

**T**hat part which we term the  
Stomack in English, in Latin  
is called *Ventriculus*, to distinguish  
it from the great ventricles. In  
Greek, *γαστήρ* and *κοιλία*, from its  
cavities.

Its deno-  
mination.

It is placed immediately under  
the midriff, which it toucheth;  
wherefore if it be too full, it cau-  
seth a difficulty of breathing, by  
hindering the motion of it. In the  
forepart, and in the right side, it is  
covered with the hollow part of  
the liver; in the left side by the  
spleen; towards the back by the  
*aorta*, the *vena cava*, and the *pan-*  
*creas*, which further its heat.

Its situati-  
on.

The bignesse of it is commonly  
such, as is capable to receive so  
much

Its bigness

much food at one time, as is sufficient for nutrition. It is lesse in women than in men, to give way to the distention of the matrix. They who have large mouths, have large stomachs.

Its connexion.

It is joyned with the *gula* on the left side, where its upper orifice is; it is tyed to the *duodenum*, where the lower orifice is on the right side. The bottome is joyned to the upper part of the caule.

Its substance.

The substance of it is membranous, that it might admit distention and constriction. It hath three membranes. The first is common, which it hath from the *peritoneum*, about the upper orifice; it is the thickest of all those which spring from the *peritoneum*; the fibres of it are straight.

The second is fleshie, and the fibres of it are transverse, under which a few oblique and fleshie lye.

The third is membranous, endowed with all kinds of fibres; the straight are most conspicuous and plentifull,



plentifull, to embrace the food firmly, untill chylication be perfected, as the second membrane hath oblique to expell the chylus.

It hath also two orifices.

Its orifices

The one is in the left side, called *sinistrum*, wider than that in the right, that meat not well chewed might the better passe. It is called in Greek καρδια, *Cor*, from whence the paines which happen in it are called καρδιαγία, and καρδιωμοι, because there is a great consent between it and the heart, by reason of the twigs of nerves which proceed from the same branch, which doe spring from the sixth paire, communicate to both; so that one being affected primarily, the other must suffer by consent.

This hath orbicular fibres, that the meat and drink being once received within the capacity of the stomach, it might be exactly shut, lest fumes and the heat should break out, which might hinder concoction.

The

The other by the Grecians is called πύλωρ, *janitor*, or doore-keeper, because it, as a Porter, doth make way for the *Chylus* to descend to the *duodenum*: It is not wide as the other *orifice*, because it was onely to transmissse the elaborate *Chylus*: wherefore besides its transverse fibres, it hath a thick and compact circle, representing the sphinter muscle, that it might the more easily open and shut.

Its veins.

It hath veines, first, from the trunk of *vena porta*, and this is *pyloricus ramus*; or from the branches of the same: wherefore from *ramus splenicus* it hath *gastrica*, from whence *Coronaria* springeth; *Gastroepiplois sinistra*, & *vas breue*, from the *ramus mesentericus*, before it be divided it hath *Gastroepiplois dextra*.

Its arteries.

It hath *Arteries* from *ramus celiacus*, which doe accompany every veine.

It hath many nerves from the sixth paire, which with the *gula* passing through the midrise, crosse

one

one another; for the right sinew doth compasse the left and fore part; but the left, the right and hinder part of the stomach. So that the upper part of the stomach is of an exquisite sense. These three vessels passe betweene the common and proper coats, and end in their orifices, in the internall membrane.

It is the seat of hunger, and soonest doth feele the defect of aliment: for blood being spent in the veines, upon the nourishment of the body, the *fibres* of the internall membrane of the stomach are contracted, and so this paine which is called hunger, is caused.

The action of the stomacke is Chylification: now *Chylus* is a white juyce, reasonable thick, like Barley creame, wrought by the faculty of the stomach out of the aliments. This is chiefly elaborate by the heat of the stomach, yet the adjacent parts putting to their helping hands; as in the right side, the

The cause  
of hunger.

Its action  
*Chylus*.

the liver ; in the left, the spleene : above the midrise, below the guts, before the caule, behind the trunks of *vena cava* and the *aorta*. This heat of the stomach is temperate, and somewhat moist, that this concoction might resemble boyling.

Its figure.

Of figure, it is round moderately, partly that it should not take too much roome, partly that it might receive much. It is somewhat long, and hath two orifices higher than the bottome, lest if one should have beene in the bottome, the aliment unconcocted should have issued out of it.

## C A P. VIII.

### *Of the Intestines or Guts.*

The etymon.

**T**He guts are called in Latine *Intestina*, in Greek *έντερος* *μα-  
γάρον εντός* *έν*). They begin at the *Pylorus*, and end in the fundamen-

They

They have a round figure, that they might containe sufficient nourishment.

They are of a membranous substance, that they might readily have constriction and dilation.

In length they are six times as long as the whole body.

They have three coats, one common from the *Peritoneum*, but mediately; for in the *duodenum*, and that part of the *colon* which cleaveth to the stomach, it proceedeth immediatly from the lower membrane of the caule; but in the *jejunum*, *ileum*, the rest of the *colon*, and the thick guts it proceedeth from the membranes of the *mesenterium*.

They have two proper, to retaine, and expell readily: The outermost is membranous, the innermost nervous; although it seem to be fleshie, by reason of the crusty substance with which it is lined; which is framed of the excrements of the third concoction of the guts themselves. It is also glazed

The figure

Their substance.

Their length.

Their coats.

sed with a mucons substance, which is nothing else but an excrementitious flegmy substance, bred in the first concoction: This furthereth the expulsion of the *feces*, and hindereth excoriation, which might bee caused when sharp humours passe thorow them.

The fibres

This internall membrane in the small guts hath oblique fibres, but the externall transverse, because these are appointed for the retention and expulsion of the *chylus*. But in the thick guts, the inner membrane hath transverse, but the outer hath oblique and straight, because they are appointed for the expulsion of the excrements: The inner membrane of the small guts is full of wrinkles, to stay the *chylus* from passing too soone. Between the common coat and those which are proper, the *vena & arterie Mesaraica* march.

Their  
veins.

The veins flow from the *porta*, although not from the same branch: For the *duodennus surculus* is sent into the *duodennum*, and the *Hæmor-*

*Hamorrhoidalis*, to the left part of the colon, and the whole *rectum*, as the *dexter mesentericus* is sent to the *jejunum*, *cacum*, *ileum*, and the right part of the colon. *Epiplois postica*, is inserted into the middle part of the colon, which marcheth transversely under the stomach; besides these a sprig from the *ramus epigastricus* of the *vena cava* is sent to the *intestinum rectum*, which maketh the externall *hemorrhoidal*.

The Arteries spring partly from *ramus caliacus*, partly from both the *mesenterica*, to the *duodenum*, and the beginning of *jejunum*; a sprig is sent from the right *ramus caliacus*; but to the rest of the *jejunum*, to *ileum*, *cacum*, and the right part of *colon mesentericus superior*: to the left part of *colon*, and to the *intestinum rectum*, *mesentericus inferior* is sent. At the last, *epiplois postica*, which riseth from the lower part of *arteria splenica*, which is the left branch of *arteria caliac*, is sent to the middle part of *colon*, which lyeth under the stomach.

Nerves

The arteries.

The nervs

Nerves they have from the sixth paire: the *duodenum* hath small twigs from the stomach, which goe to the *pylorus*. The other guts have very many, which spring from the branch, which is bestowed upon the roots of the ribs: but the *intestinum rectum*, about the *podex*, hath foure twigs from the fifth conjugation of those which spring from the *os sacrum*. This is the cause why so great paine is felt in the *colon*, & *rectum*, when they are ill affected.

The fat.

The guts have fat without, and not within.

The difference  
of the guts.  
The thin.

The guts are of two sorts; for they are either thin or thick.

The thin, which have thinner membranes, are in number three.

The first is *duodenum*, because it is thought to have twelve inches in length. It doth passe directly under the stomach, to the beginning of those guts which begin to be gathered by the *mesenterium*, for this is tyed with it.

2

The second is *jejunum*, or the hungry gut; for in dead carcasses it



it is for the most part found empty, partly by reason of the multitude of the veins, partly by reason of the acrimony of the choler, which proceedeth pure from the liver. In length it is 12. hands breadth and three inches, and as broad as the ring finger. The internall membrane is longer than the externall; for it hath innumerable orbicular, and transverse wrinkles to stay the *chylus*. It beginneth on the right side, under the *colon*, where the *duodenum* endeth, and the guts begin to be wreathed, and filling almost the whole umbilicall region, it endeth into the *ileum*: of all other guts it hath greatest store of veins and arteries; and by these you may find the circumscription of it. *Meatus biliaris* is inserted into the beginning of this gut, which sendeth choler from the gall, which pricketh the guts to hasten expulsion.

The third is *ileum*, it hath thinner membranes than the rest of the *tenuis*. It is seated under the navel,

vell, and filleth both the *Ilia*. It is the longest of all the guts, for in length it containeth 21. hand-bredth; but it is the narrowest of all, for it is but an inch in bredth. It hath fewer wrinkles than the *jejunum*, and lesser, which about the end of it scarcely appeare.

It beginneth where both smaller and fewer veins appeare, and endeth about the place of the right kidney, where it is joyned both with the *intestinum cecum*, & *colon*. The externall coat of the *tenuia intestina* is more thin and fleshie than the internall. It hath transverse and orbicular fibres, with a few straight to strengthen the transverse. The internall coat it hath partly straight, partly oblique fibres: Yet fewer straight than the *crassa intestina* have. These guts have a motion such as worms have when they crawl, or leeches when they suck, to draw downward the *chylus*: for it is not in our power to send this away, as wee doe the excrements. The *crassa intestina* have

have not this motion, and by reason of this motion, the upper part of the gut may bee wrapped in the lower, which causeth the sicknesse called *ileos* or *convulsus*.

Now follow the *intestina crassa*, the great guts; they are three in number also.

The thick guts.

The first is called *cæcum*, *πελδν*, the blind gut, because one end of it is shut, so that at the same orifice the *chylus* passeth, and returneth. In man it is like a thicke round worme coyled together. It is bigger in an infant than in a man; foure inches in length and one in bredth. It is not tyed to the *mesenterium*; but being couched round, it is tyed to the right kidney. In sound persons it is alwayes empty. In foure footed beasts it is alwayes full of excrements. Apes have it larger than a man, Dogs larger than Apes; but Conies, Squirrels and Rats, largest of all, if you consider the proportion of their bodies.

I

The second is *colon*, *κόλον*, *παρὰ τὸ*

2

C

*κολύην*:

κοιλίην. because it detaineth the excrements. It hath its beginning from *ileum & cæcum*, and mounting up by the *dextrum ilium*, when it comes to the liver it passeth transversly under the stomach to the left *ilium*, and from thence to the beginning of *os sacrum*.

It is tyed first to the right kidney in the right side, by the externall membrane, then in the middle to the bottome of the stomach, and at the last unto the left kidney. In length, it is of seven hand bredth, and seven inches. It is the broadest of all others, that it might contain all the excrements.

It hath cells, which spring from the internall tunicle of it: These cels are kept in their figure, by a ligament halfe an inch broad, which passeth through the upper and middle part of it all alongt; this being broken or dissolved, the cels appeare no more. Their use is to hinder the flowing of the excrements to one place, which would presse the parts adjacent.

It

It hath a valve where it is joy-  
ned with *ileum*, like to the *Sigmoides*  
in the *Sinus* of the heart. This  
valve so stoppeth the hole which is  
common to the *ileon* and *colon*, that  
flatuosity cannot ascend to the *ile-*  
*um*, much lesse excrements regur-  
gitate. If one would find this out,  
let him poure in water into the *in-*  
*testinum rectum*, and hold up the  
guts: The water will stay when it  
is come to the valve, if it be sound.  
If this valve bee relaxed by sick-  
nesse, excrements may regurgitate,  
and expelled by vomit and clysters  
also come to stomack.

The third is *intestinum rectum*,  
the straight gut: it hath its begin-  
ning where the *colon* endeth, and  
endeth where it maketh the *anus*:  
it is of a span in length, not so wide  
as the *colon*, the muscle *σφιγκτηρ*, is at  
the end of it: It hath thick and  
fleshy externall coats, and so a so-  
lution of unity in it may the sooner  
be united. It hath many transverse  
fibres, few oblique, and some  
streight. It hath veins not from

*Porta* onely as the rest; but from the trunck of the *Cava* descending also, which make the externall Hemorrhoidall.

The guts have a threefold use; for first, they all concoct the *chylus* sent from the stomach better.

Secondly, the small guts digest the *chylus*.

Thirdly, the thicke guts expell the excrements.

## C A P. IX.

### *Of the mesenterium.*

**T**He substance is membranous; First, that it might bee light, and should not presse together the vessell by its weight: Secondly, that it might bee extended into all dimensions, by reason of the fibres: Thirdly, that betweene the membranes it might the more readily gather fat.

It is of a circular figure, which is most capable, that it might answer the length of the guts, and keep

keep them within a small compasse and place likewise.

It is framed of two proper membranes, one above another, strong enough; and one common between which and the proper, the vessels passe safely to the guts.

The veins are called *Mesaraica*, these spring from *ramus mesentericus*, *dexter & sinister* branches of the *Vena Porta*.

It hath also two arteries, the one superior, the other inferior, branches of the *arteria mesenterica*, which passe as the veins doe.

As for the nerves, it hath two on each side, springing from the branches of the sixth pair, which goe to the roots of the ribs; others it hath from those which spring from the *spinalis medulla*, between the first, second, third and fourth *vertebra* of the loynes.

That the vessels might passe safely wthout ruption, Nature hath placed glandules betweene the divarications of the veins and arteries.

Glandules

he big-  
gest.

The biggest of these is about the center of the *mesarion*, where the distribution of the vessels beginneth.

If this become scirrhus, the extenuation of the whole body ensueth, because the passing of the *chylus* is hindered: leane persons have larger glandules than the fat, because the fat doth sufficiently guard the distribution of the vessels, and preserveth the heat of the vessels.

The arteries bring spirit; but the veins doe bring both the *chylus* to the liver, and nourishment to the inner parts; but not at the same time: As wee take breath by, and let it out by the same instruments, but not at the same time: see *Galen* 2. *facult. nat.* 13. & 4. *de us. part.* 14. So at one time the liver draweth from the belly, and at another time the belly from the liver. When the guts are full, the *chylus* is sent to the liver; but when they are empty, they draw nourishment.

It hath two parts, *Mesarion*,  
μεσάριον, ὃν μέντοι οὐ ἀραιὸν ἐστίν



ἔτι; and *μικρόλον, quasi μίσον τὸ κώλον*.  
The first tyeth the small guts together; the second the thick.

The *Mesaraum* is in the circumference three yards, but a span in breadth.

The big-  
nelle of  
the *mesa-  
raum*.

It springeth from the ligaments of the *vertebra* of the loynes, by two roots; the largest about the first *vertebra*; the other lesser, about the third. It was fit that it

Its begin-  
ing.

should bee tyed among these ligaments, lest it might have been torne by violent motions, or bee pulled from thence by the weight of the guts being full.

And as plants draw their nourishment by their roots from the earth, so living creatures which have blood, draw their nutriment from the guts, by the *mesaraick* veins. Wherefore lest they should suffer ruption, Nature would have them to passe safely between membranes.

The use of it then is to carry safely the vessels which passe to the guts.

It is tyed before to the small guts; but behind to the first and third *vertebra* of the loyns, from whence it springeth.

It is called *μειντήριον*, & *μειντέριον*, *quasi μέσον ἢ ἑντέρων*.

*Mesocolon.*

*Μεσocolon* is that by the which the thicke guts are tyed together. *Hippoc. 6. Epid. & Galen. 4. Aphor. 6.* make mention of this. It is tyed in the right side, to the right part of the *ileum*: but in the left side to the left part of *ileum*, and the muscle *psoas*: before it is tyed to the *colon*, & *rectum intestinum*.

## C A P. X.

### *Of the Vena lactea.*

**T**HIS is the opinion of all the ancient and modern Writers, concerning the mesenteric, and the mesaraicall, if you except *Caspar Asellius*, who by his diligence found these veins, which he calleth *lacteas*, because they contain a white juyce, which is nothing else but

Why so  
called.

but the *chylus* elaborate, which they carry from the small guts to the liver.

Their beginning seemeth to be in the *Pancreas*, for there they all meet, and are strangely implicate and twisted together: from thence they passe upward to the liver, and downward to the small guts: so that the *Pancreas* is a more excellent part than it hath been hitherto taken by other Anatomists: and as the mothers blood before it be sent by the *vasa umbilicalia* to nourish the infant, is first committed to the *placenta uteri*, to draw from it all impurity: so then these *vena lactea* discharge their impurities, before they carry the *chylus* to the liver in the *Pancreas*.

Their beginning.

They are inserted into the small guts, and have nothing to doe with the stomach. They passe into the capacity of the guts, and end in the wrinkled crust, with the which the internall membrane of the guts is lined, with their spongiuous heads like to Leeches, by the which they

Their insertion.

Their pro-  
greffe.

draw to themselves the *chylus*.

From the small guts, they march betweene the two membranes of the *mesenterium*, sometimes severed from the other vessels, sometimes ioyned with them, sometimes directly, sometimes over-riding them, making a Saint *Andrewes* croffe thorow the *glandules*, untill they come to the *Pancreas*, where they are inexplicably twisted one with another: from thence having greater branches, they passe by the sides of *vena porta* to the cavity of the liver, where they are spent by ending there by small twists: and so it is most likely that sanguification is performed by the substance of the liver, and not by the veins: the grosser part of it being sent to the branches of *vena porta*, and the subtillest to the branches of *vena cava*.

The difference  
betweene  
them and  
the ordi-  
nary me-  
saraicall  
veins.

They differ from the ordinary mesaraicall veins;

First, in bignesse; for these are bigger, but those are more in number; for they are twice as many:  
for

for more *chylus* must be sent to the liver to make blood of, for the nourishment of the whole body, than blood for the nourishing of the inward parts only.

Secondly, the valves which are seene about the endings of these, are placed from without inwards, but of these from within outwards. The reason of this diversity is this: the *vena lactea* suck the *chylus* from the guts, which ought not to returne; but the ordinary mesarai-call send blood, and sometimes excrementitious humours, which ought not to come backe again.

If you would find out these veins, you must feed a dogge with milk, and five or six houres afterward dissect his belly; then by stretching the mesentery you shall perceiue them.

That the Ancients did not find out these veins, the cause is, either because they dissected beasts after they were dead, or after that the *chylus* was distributed, or they did presently take a view of the mesentery;

Their  
valves.

How to  
find them  
out.

Why the  
Ancients  
did not  
find these  
out.

Why they  
have no  
trunck.

mesentery ; but made some stay about the inspection of some other part.

They have no trunck , because they were to end in the liver , and to goe no further. From this part many diseases spring : first, because it is composed of two membranes, having innumerable veins and arteries, and so it may containe many impurities : secondly , because it hath many glandules, which as a sponge imbibe superfluities.

## C A P. XI.

### *Of the Pancreas.*

**I**T is called *παγκρέας* and *καλλι-  
κρέας*. It is the biggest glandule of the whole body, and very red, like unto soft flesh, from whence it hath its name.

In figure it is ovall, three or foure inches in length. It is placed in the left side towards the spleen ; above, the stomach resteth upon it ; below, the membranes of the pe-

*ritonamentum.*

*ritonaeum* lie, unto which it is firmly tyed. It doth keepe within it selfe *ramus splenicus*, the left branch of *arteria coeliaca*, the nerves which passe from the sixth paire to the stomacke and the *duodenum*.

It hath a membrane from the *peritonaeum*, by the which it is covered and holden up.

It hath three uses. First, it stayeth the liver, lest it being distended by too much meat and drinke, should be hurt by the hardnesse of the *vertebrae* of the back.

Secondly, to keepe the vessels passing through it from ruption.

Thirdly, to keep these same from compression, when the stomacke is too much stretched by meat and drink.

## CAP. XII

## Of the Liver.

*Now follow the parts appointed for sanguification, whereof the Liver is the chiefest.*

**T**He substance of the Liver seemeth to bee a red fleshy masse. In the first formation of the birth it is framed of blood wizing out of the veines, and there coagulating about them.

The substance of the Liver is so set about the branches of the *vena porta* and *cava*, that it filleth up all cavities, and doth firmly stay them, keeping them open from purfing together, and in comely order, that they be not confounded. It is the thickest and heaviest of all other entralls.

Its bigness

It is bigger in man than any other living creature, if you consider the proportion of his body; for it was fit so to be, seeing man was



was to have the greatest store of blood, lest spirits should faile in performing the functions of the soule, wherewith man is most copiously furnished. Besides, seeing he hath but one Liver, the bignesse was to recompence the number: wee may ghesse of the bignesse of it by the bignesse of the fingers.

It is covered with a very thin membrane, which springeth from the second ligament of the Liver, which cleaveth firmly to the substance of the Liver. If it be separate at any time by a watrish humour, issuing out of the vessels from the fleshie substance, watrish pustuls, by the Grecians called *vidantes*, are ingendered. If these doe breake, the water falleth into the cavity of the belly, and causeth that kind of drop sic called *ascites*.

It hath veines as well from the *cava* as the *porta*.

The branches of the *cava* are distributed for the most part thow

Its veines.

row

row the gibbous part; but those of the *porta*, into the hollow part: yet so that the branches of both are joyned by inosculation to deliver the purest blood to the *vena cava*, for the nourishment of the vitall parts; and the grossest by the branches of the *porta*, for the nourishment of the naturall. There seemeth to be three times more of the twigs of the *porta*, than of the *cava*, within the liver.

Amongst the midst of the branches of the *porta*, some little veins march; which afterward becoming one twig, end in the *vesicula fellea*, that the bilious humour may be sent to it, before the blood enter into the *vena cava*.

Its arteries

It hath onely few arteries, which springing from the right branch of the *cœliaca*, end in the hollow part of the Liver, where the *vena porta* commeth out.

Its nerves.

It hath two nerves, but very small, because it hath but a dull sense. One commeth from the branch which is sent to the upper  
orifice

orifice of the stomach; the other from that branch which is dispersed thorow the roots of the ribs of the right side.

As for the figure of it, it is almost round, the upper part is arched and smooth, and so framed, that it might not hurt the *diaphragma*.

Its figure.

The lower part is hollow to receive the stomach, which is of a sphericall figure.

In the upper and convex part, which is distant but one inch from the *diaphragma*, to give way to it when it is dilated in breathing, and to the stretching of the stomach; it is tied first to the *diaphragma*, by a ligament membranous, broad, and strong, which springeth from the *peritoneum*, where it covereth the midrise in the lower part. It passeth transversly by the Liver, to the hinder parts; by this ligament, it is stayed from falling downe. It is called the Suspensory.

Its ties.

Secondly, in the fore-part it is stayed

stayed by two ties; by the first it is tied to the *mucronata cartilago*, to hinder it from falling to the back parts, when we stretch our back: this ligament is broad, double, and strong, and springeth from the *peritonaeum*, and giveth the Liver its coat. Into this coat the two sinewes are implanted, according to *Galen, lib. 3. de loc. affect. cap. 3.* and not into the substance of the liver: so that, according to *Galen, 4. de us. part. cap. 13.* it hath but a dull feeling, such as plants have to embrace that which is profitable, and to leave that which is unprofitable.

By the second it is tied to the navell; this is the umbilicall veine, which when the Infant is borne, leeseth its hollownesse, and becommeth a ligament. This stayeth it from being pulled upwards.

Thirdly, it is tyed to the short ribs, by small fibres, to keepe it steady. In the hollow part it is tied by the *mesenterium*, to the ribs by the *vena cava*.

It

It differeth from the Liver of beasts, in that it hath seldome any lobes; yet the hollow part of it hath a fissure, or chink, wherein the umbilicall veine is implanted, and two small bunchings out in the right part, where the *vena porta* marcheth out, which *Galen* calleth *πύλας*, gates.

Its differences from the liver of beasts.

Besides these, there is a little lobe of a softer and thinner substance than is the rest of the Liver, and is covered with a membrane: It is tied to the *omentum* by this lobe, by the which *Spigel. de human. corp. fabric. lib. 8. cap. 12.* thinketh that waters may bee discharged out of the Liver into the caul.

A little lobe.

It is placed in the lower belly, in the right side, covered with the ribs for safety, and in the middle of the trunck of the body, to send blood equally to the upper and lower parts. The stomach is cherished by it, and the spleen; but because it is a more noble part than the spleen, it is placed in the right *hypochondrium*.

Its situation.

The

Its action.

The proper action of it is not onely to further sanguification, perfected in the veines, as all ancient Anatomists averre; but to sanguifie the *chylus*, carried to it by *vena lactea*, as *Asellius* hath proved.

A note.

One thing is to be noted, that the substance of the Liver, in the convex part, where the *vena cava* is lodged, is softer than that which is in the hollow part, where the *vena porta* is: for there it may be more easily separate from the vessels, than here; and not without cause: for the roots of *vena porta* ought to bee stayed by a harder substance, that they be kept wider; but the roots of the *cava* with a softer, that they might the readier be filled, stretched, and slacked,

## CAP. XIII.

Of the *vena porta*.

SEeing the roots of the veines which Nature hath appointed to furnish blood, the nutriment of the body, have their roots in the Liver; having discoursed of it, method doth require to set downe the doctrine of them.

Although there is but one artery to impart life, yet there are two veines, the *vena porta* and *cava*. Because some require a grosser blood for nutrition, as those parts are which serve the nutritive faculty, which are, the liver, the gall, the stomach, the spleene, the *pancreas*, the *omentum*, the guts, and the mesentery. For unto the rest, as the kidneyes, bladder, and those which are appointed for procreation, the *vena cava* sendeth branches.

It is fit to begin with the *vena porta*, because it goeth no further than to the parts contained in the abdomen,

The veins  
of it.

*Vena porte*

Why so  
called.

How it  
differeth  
from *vena  
cava*.

abdomen, and not to all, those nei-  
ther.

It is so called, because it seem-  
eth to enter into the liver by the  
two fleshy bunches called *porta*,  
gates.

This doth differ from the *vena  
cava*.

First, in substance; for the sub-  
stance of this is thicker and black-  
er, because it is nourished with  
thick and black blood; but that  
of the *vena cava* is whiter and  
thinner, because it is nourished  
with a thinner and redder blood.

Secondly, the substance of the  
*vena porta* is harder than that of  
the *cava*; which ought to be sof-  
ter, because it ought to be more  
apt for dilatation and constricti-  
on; first, because it containeth a  
more movable blood; partly be-  
cause its thinner, having much se-  
rosity mingled with it; partly, be-  
cause for the most part the bran-  
ches of it are accompanied with  
the branches of the great artery,  
whereas the branches of the *porta*  
are



are farre enough off, if you except  
*ramus splenicus*.

Thirdly, the trunk of *vena cava* is larger than that of *porta*, because it nourisheth more parts, as hath been said.

Fourthly, the *porta* hath more roots within the substance of the liver than the *cava*,

The roots of the *vena porta* and *cava* are joyned by the union called *Anastomasis*, or inosculation. This is performed by two wayes: First, when the ending of one doth meet with the end of the other; as the *epigastrica vena* meet with the *mammaria* in the lower side of the *musculi recti*.

Secondly, when one branch resting upon another, doe cleave together, having a hole in the middle. This inosculation is scene in the roots of the *vena porta*, and the *cava*.

One thing is to be noted, that there are many of the twigs of the *vena porta* which touch not those of the *cava*; because the purest part

How inosculatation is performed

A note.

part of the blood was onely to be carried to the *vena cava*, and the thickest to remaine in the *vena porta*. By reason of these *Anastomoses*, in famine nourishment is sent from the habit of the body, by the *vena cava*, to nourish the internall parts

*Banhin* affirmeth, that there is a common conduit to the roots of *vena porta* and *cava*, which in its cavity will receive a small prebe. In these veines, besides blood, excrementitious humours are also contained in diseased persons, which sometimes are sent from the whole body by the *vena cava* into the guts, and sometimes communicate to the *vena cava* by *vena porta*

How the  
inofculation  
of these  
veines is  
found out.

To find out the radication and inofculation of these veines, you must boile the liver untill it become soft, and so with a wooden or bone knife separate the substance from the vessels; for a sharp knife is not fit.

Now to come to distribution of

*vena*

*vena porta*, it hath parts: 1 *Radices*, the roots. 2 *Truncus*, the truncke. 3 *Rami*, the branches. 4 *Sarculi*, twigs.

The distribution of  
*vena porta*.

Its roots.

As for the roots, first from the circumference of the liver small capillar veines march toward the inner part of it; and by combination becomming greater, they make up five branches. These about the middle of the hollow part, yet towards the back joyning together, make up one root, which at the last comming out of the liver, about the eminences, called *porta*, frame that trunck which is called *Vena porta*.

Its branches.

This trunck parting a little from the liver, before it be severed into branches, it puts forth two twigs; the one being small and springing from the upper and forepart of the trunck, as soone as it parteth from the liver, is inserted into *cystis fellea*, about the neck of it, and spread by innumerable twigs, thorow the externall coat of it.

*Vesalius* affirmeth, that there be

D

two

two of thesetwigs, from whence some call them *cystica gemellæ*: but this is a matter of no great moment. Thistwig may be called *furculus cysticus*, or *vesicalis*.

The second twig is bigger, but lower. This springeth from this same forepart, yet towards the right side, and is inserted into the bottome of the stomach: from hence it sendeth many sprigs toward the hinder part of it, towards the back.

It may be called *pistoricus* more properly than *gastricus*, seeing there are other branches which are called *gastrici*. Having sent forth thesetwo twigs, the trunk passeth down, and bending still a little towards the left side, it is parted into two remarkable branches; whereof the one is called *sinister*, or the left, seated above the right, but lesser: the other is *dexter*, or the right, lower than the left, yet larger: the left is bestowed upon the stomach, the *omentum*, a part of colon, and the spleen: the right

is spread through the guts, and the *mesenterium*; the left is called *vena splenica*, but the right, *vena mesenterica*.

The *vena splenica* hath two branches before it comes to the spleen, the superiour and the inferiour. The superiour is called *gastricus*, or *ventricularis*. This is bestowed upon the stomach; the middle twig compassing the left part of the orifice of the stomach like a garland, is called *coronaria*: from the lower branch two twigs do spring, the one is small; this doth send other twigs to the right side of the lower membrane of the *omentum*, and to the colon annexed to it. This is called *epiplois*, or *omentalis dextra*; the other is spent upon the lower membrane of the *omentum*, which tieth the colon to the back, and upon that part of the colon it is called *epiplois*, or *omentalis postica*: when the *ramus splenicus* hath approached to the spleen, it doth send out two other twigs, the uppermost and the lowermost: from the

Branches  
of *Vena  
splenica*.

uppermost *vas breue* springeth, which is implanted in the left part of the bottome of the stomacke commonly: from the lowermost, two twigs issue.

The first is called *gastroepiplois sinistra*, this comming from the lower part of the splene towards the right side, is bestowed upon the left part of the bottome of the stomack, and the upper and left part of the *omentum*.

The second springeth most commonly from *ramus splenicus*, but seldome from the splene; and passing along according to the length of the *intestinum rectum*, it is inserted into the *anus*, by many twigs. This is called *Hæmorrhoidalis interna*, as that which springeth from the *vena cava* is called *hæmorrhoidalis externa*.

*Vena Mesenterica.*

Now followeth *vena Mesenterica*, or the right branch of *vena porta*; before it be divided into branches, it sendeth forth two twigs.

The first is called *gastroepiplois sinistra*

*sinistra*, this is bestowed upon the right part of the bottom of the stomach, and the upper membrane of the caule.

The second is called *intestinalis*, or *duodena*: It is inserted into the middle of the *duodenum*, and the beginning of the *jejunum*, and passeth according to the length of them. This branch as soone as it passeth from the back, it entereth into the *mesenterium*, and passing between the membranes of it, sendeth forth those mesaraicall veins, which send nourishment to the inward parts.

It is divided into two branches, to wit, *Mesenterica dextra*, & *sinistra*: *Mesenterica dextra*, placed in the right side, sendeth a number of branches to feed the *jejunum caecum*, and the right part of the *colon*, which is next to the kidney and liver.

It hath fourteene remarkable branches, but innumerable small twigs. One thing is to bee noted, that the greater branches are sup-

ported by the greater glandules, and the smaller by the smaller glandules. *Mesenterica sinistra* passeth through the middle of the *mesenterium*, and that part of *colon* which passeth from the left part of the stomach, to the *intestinum rectum*.

Its uses,

The chiefe use of the *vena porta* is, to nourish the parts which are appointed for nutrition, with thick and seculent blood: It ought to be thick, that it might bee the hotter; for heat in a thick body is more powerfull.

The second use is to further the sanguification of the liver.

#### CAP. XIV.

Of the *Vena cava*, dispersed within the trunk of the body.

**W**ithin the trunk of the body, the *vena cava* hath two trunks; one called *ascendens* or going up, the other *descendens* or marching down.

The



The *ascendens* passing through the nerves, part of the *Diaphragma*, it marcheth upward undivided, untill it come to the *jugulam*: yet by the way from its sides it sendeth two twigs.

Its sprigs

The first is *Phrenica*; this is inserted into the midrife and heart; from hence springeth the *coronaria vena* which compasseth the basis of the heart, as a garland.

1

The second is *vena sine pari*, so called, because it hath not a fellow in the left side as other veins have. It doth spring about the fifth *vertebra* of the brest, from the hinder part of the *vena cava*, in the right side. This going downe, it marcheth towards the *Spina*: when it is come to the eighth or ninth rib above the *Spina*, it is divided into two branches, to wit, the right and the left; the left is inserted most commonly in the middle of the left emulgent veine. By this branch, blood, or waterish, or purulent matter may bee discharged by urine; the right twig is implanted

2

The branches of *vena sine pari*.

either into the trunk of the *cava*, or into *primæ lumbæ*.

This being done, the *vena cava* ascendeth up to the *jugulum*, being strengthened by the *mediastinum* and the glandulous body called *thymus*. Here the *vena cava* is divided into two remarkable branches, from whence those veins spring which are sent to the head, to the armes, and some muscules of the *abdomen*. One passeth to the right side, the other to the left; the one is called *subclavius*, because it marcheth under the cancell bone within: The other is called *axillaris*, when it is come to the armpit; from the upper part of the *ramus subclavius* two remarkable branches proceed: the internall and externall jugular; in man the internall is biggest, but in beasts the externall.

The branches of *ramus subclavius*.

I

The internall jugular cometh out about the articulation of the cancell bone with the *sternum*; then it joyneth it selfe with the superior arterie, and the recurrent nerve;

nerve; and with its hinder and greatest branch, accompanied with the superior arterie, it entereth with the *cranium* at the hole of the occiput, by the which the sixth paire of nerves commeth downe, it entereth into the first and second *sinus* of the *dura mater*,

The externall jugular mounteth up to the eare under the skin, and the quadrat muscle which pulleth down the cheek alongst the neck: from this branch spring the veins which are opened under the tongue.

From the lower part of *ramus subclavius*, spring foure branches.

The first, *Intercostalis superior*, one on each side; it is small, and commeth out about the root of the bifurcation: then passing downe by the roots of two ribs, it bestoweth twigs upon the distances of these two ribs.

The second is *Mammaria*, this marcheth forwards towards the upper part of the brest bone: then it goeth downe by the sides of it,

D 5

and

Sprigges  
springing  
from the  
lower part  
of *ramus  
subclavius*.

and when it is come to *cartilago mucronata* about the sides of it, it commeth out : from thence it passeth straightwaies under the right musclet to the navell, where by an *anastomasis* it is joyned with the *epigastrica ascendens* : from hence commeth that great consent between the matrix and paps.

The third is *Mediastina*, because it is bestowed upon the *mediastinum*, together with the left nerve of the *diaphragma*, according to its length.

The fourth is *Cervicalis*, or *Vertebralis*. This passing thorow the holes of the transverse processes of the *vertebra* of the necke, is bestowed upon the muscles of the neck which are next to the *vertebra*.

CAP. XV.

Of the Gall.

**T**He Gall, called in Latine *Vesica biliaria*, or *Folliculus felleis*, is a dissimilary part, in figure representing a Peare, hollow, and appointed to receive the thin yellow choler.

The description of it.

It is about two inches in length.

Its bigness.

By its upper part it is tyed to the liver, which doth afford it a hollownesse to receive it; but the lower part, which hangeth without the liver, it resteth upon the right side of the stomach, and the colon, and doth often die them both yellow.

Its connexion.

It hath two membranes, the one common, which is thin and exterior, without fibres. This springing from the membrane of the liver, it onely covereth that part which hangeth without the liver; The other membrane is proper.

Its membranes.

This

The fibres  
of the pro-  
per mem-  
brane.

This is thick and strong, and hath three sorts of fibres, the outermost are transverse, the middlemost oblique, and the innermost straight.

This membrane is harder and thicker in the neck; but thinner in the bottome. Within, it hath a mucous substance, engendered of the excrements of the third concoction of the membrane, to withstand the acrimony of the choler.

The parts  
of it.

It hath two parts, the neck, and the bottome.

The necke is harder than the bottome, and higher in situation.

It from the bottome by degrees growing narrower and narrower, at last endeth in the *ductus communis*, or the common passage of the choler, to the beginning of the *jejunum*.

This elongation of the neck of the *vesicula fellea*, is called *meatus cysticus*, because it springeth from the *cystis*.

The choler is carried to the neck  
of

of the *cystis*, by many small veins, neere to the roots of the *vena porta*, about the midst of them, and is discharged into the cavity of it, about the upper part.

The *meatus cysticus* hath three valves looking from without inwards, to hinder the recourse of the choler to the liver.

The other passage which carrieth the thick and corrupt choler, as that which is called *vitellina*, *eruginosa*, *porracea*, &c. is called *meatus hepaticus*; because it passeth straightway from the liver to the *ductus communis*.

This passage hath no valves, both these discharge their choler by the common passage into the beginning of the *jejunum*, when the small guts are discharged of the *chylus*.

Beasts which want the *vesica fellea*, have this *meatus hepaticus*, as Harts, Hynds, and fallow Deere, and those which have a whole hoofe.

The *meatus hepaticus* passeth thorow

How the choler is carried to the gall.

Its valves.

*Meatus hepaticus*.

What beasts have this passage only.

thorow the roots of the *vena cava*, by innumerable branches, which being gathered together become one branch; and being united with the *meatus cysticus* make up the *communis ductus*, which is inserted into the beginning of the *jejunum* obliquely, between the two membranes of the intestine, about the distance of two inches, before it perforate the second membrane.

The *vesica fellea* hath for nourishment called *cystica gemelle*.

Its vessels.

For life it hath sprigs of arteries proceeding from the *Celiacæ*. To afford sense, it hath a small threed like a sprig of a sinew from the sixth paire.

Of the stones in it

Many times stones are found in it, but they being lighter than those of the bladder, swim above the water.

The use of the passages.

The use of these two passages, is to draw all superfluous choler from the *chylus*, and to turne it into the guts, where it affordeth benefits to nature:

The uses of the choler.

For first by its sharpnesse it moveth



veth the intestines to turne out the terrestriall excrements in due season.

Secondly, by reason of its thinnesse it doth cut and cleanse the small guts of flegme, which there is plentifully bred.

Thirdly, by reason of its drinessse it hindreth the encrease of putrefaction.

Fourthly, it furthereth concoction in the intestines by encreasing their heat: nevertheless, naturally there can be no passage to carry choler to the bottome of the stomach.

For first, by reason of its acrimony it would corrode it.

Secondly, it would cause the crude nourishment to passe into the *duodenum*.

Thirdly, it would procure perpetuall vomiting. If it fall out that choler be carried to the bottome of the stomach by any passage than this, the party vomiteth choler, and is termed *πυρόχολος ἄνω*, but if it bee inserted into the end of the *jejunum*, then

2

3

4

Why choler is not carried to the stomach.

1

2

3

then bilious dejections follow:  
and such a one is termed *πυρρὸς*  
*καὶ πυρρὸς*.

A note.

One thing I would have you observe; that the *porus biliaris* passeth by a straight course to the *ductus communis*, and not to the *vesicula fellea*, which thus you may shew: put a *catheter* into the necke of this passage neere the liver, the guts will bee blowne up, and not the *vesicula*. Againe, put the *catheter* into the common passage, and both the *cystis fellea*, and the *meatus cholidochus* will bee blowne up.

How the valves are found out.

If you would finde out the three valves of the *vesicula fellea*, presse the choler with your fingers from the bottome towards the necke; where you finde the choler to stay, there the valves are.

CAP.

## CAP. XVI.

*Of the Spleen.*

**T**He Spleene or Milt in English, in Greek is called *Splen*, and *Lien* in Latin.

The substance of it is flaggie, loose, and spongy, net-like, which is the cause that it may imbibe much superfluitie, and so become exceedingly swelled.

Its substance.

This substance is covered with a membrane borrowed from the *peritonaeum*, which is inserted first into the straight line of the milt, and then covereth the whole Spleen: It is thicker than that of the liver. First, because it hath a looser substance. Secondly, because it hath more arteries, which require a strong membrane to defend them. The straight line is in the hollow part, where the vessels of the Spleen doe enter into it.

Its membrane.

In infants new borne it is of a red

Why it is red in infants.

red colour, because they have been fed with elaborate blood; but in those of a ripe age it is somewhat blackish: being boiled it representeth claret wine. In man it is bigger, thicker, and heavier, than in beasts; for it is six inches in length, three in breadth, and one in thicknesse; yet according to *Aristotle*, 3, *hist. Animal.* 6. a convenient little one is better than a big one.

Its figure.

In figure it is somewhat long, like an Oxes tongue.

Its situation.

It is seated in the left *hypochondrium*: so *Hippocrates* 6 *Epidem.* calleth it the left liver; and *Aristotle* 3. *part. Animal.* 7. the bastard liver, but is seated somewhat lower, because it was to draw the terrestriall part of the *Chylus*, before it come to the liver by *ramus splenicus*, that the blood may be made thinner, and purer, for such blood causeth men to be wiser, 2. *de part. anim.* 2. It is all couched within and under the short ribs; so that in healthfull persons it cannot be felt; only

only if it be inflamed a pulsation may be felt.

It is tyed to five parts; to the midrise and left kidney by small membranes, by its hollow part which giveth way to the stomach, being distended to the upper membrane of the *omentum*, and to the stomach by *vas breve*. In its arched part it is tied to the back, so that dints remain in it by the impression of the ribs.

Its connexion.

It hath veines for nourishment from *ramus splenicus*; for life it hath arteries from *ramus celiacus sinister*; but five times more than veines, for great heat is required for the elaboration of thick blood. These vessels enter into the spleen where the straight line is in the hollow side. They joyne often by *anastomoses*.

Its vessels.

The arteries besides life afford unto the spleen two benefits.

The uses of the arteries of the spleen

First, they encrease the naturall heat of it, that it may the better concoct the grosser part of the *Chylus*,

By what  
wayes the  
Spleen sen-  
deth its su-  
perfluities  
to the kid-  
neyes.

1

2

*Chylus*, which is sent unto it by the *ramus splenicus*.

Secondly, they further the expulsive faculty of it.

Now the spleen sendeth its superfluities to the kidneyes by two wayes.

First, by returning of them by *ramus splenicus* to the *vena portæ*, and from thence to *vena cava*, from whence they are sent to the emulgent veines.

Secondly, by a shorter passage they are sent from *arteria cœliaca* to the *aorta*, and from thence to the kidneyes by the emulgent arteries.

Last of all, it hath small twigs of nerves from the sixth pair, which are bestowed upon the investing membrane, but are not communicate to the substance: wherefore it must be but of a small and dull feeling; so that the paines which sundry ascribe to the spleen, are to be referred to the adjacent parts.

The use of  
the spleen

The use of the spleen, as also of  
the

the liver, is to further the elaboration of the concoction of the *Chylus* : for it is a bastard liver, according to *Arist. 3. de Histor. animal. 7.*

The sanguification of the spleen differeth in two points from that of the liver.

First, in the materiall cause; for the spleen maketh grosse blood of the more earthy part of the *Chylus*; but the liver farre purer of the thinner and more benigne part of the *Chylus*.

Secondly, it differeth in the finall cause; for the liver sanguifieth to afford nourishment both to the vitall and animall parts; but the spleen onely to maintaine the naturall parts, and not all of them neither.

Nature would have the naturall parts to bee furnished with grosse blood by the branches of *vena porte*, partly to encrease their heat; for heat in a thicke body is stronger; partly to afford them nourishment answerable

How the sanguification of the spleen differeth from that of the liver.

1

2

Why the naturall parts are nourished with grosse blood.

swerable to their substance, for it is thick.

## C A P. XVII.

### *Of the kidneys.*

Their denomination.

**T**He kidney is called in Latin *Ren*, from *ren*, to flow; because the serosity of the blood doth flow through the kidneys to the ureters, and from thence to the bladder.

Their number.

They are in number two; not so much for the poisoning of the body, as for their use and necessity; that one being stopped, yet the cleansing of the blood might be performed by the other.

Their places.

They are seated in the loynes under the liver and spleen, and rest upon the muscles called *phat*, which move the theyght about their heads, under the which large nerves are couched. Which is the cause that a big stone being in the kidney, a numnesse is felt in the foot



of that side, the muscle *ala* being pressed down by it: They lie behind the guts. The right kidney hath the *cæcum*, but the left the *colon* above it. In man the right kidney is lowest, by reason of the greatnesse of the liver, and bigger also than the left; yet it is not so fat as the left, by reason of the vicinity of the liver; whose heat hindereth the encrease of fat.

In figure they resemble the *asarium* leafe, or kidney beane: towards the loynes they are gibbous, but hollow towards the guts.

As for their connexion, by the externall fat membrane they are tied to the *diaphragma*, and the loynes; by the emulgent vessels to the *vena cava*, and the *aorta*, and by the ureters to the bladder.

They are in length about five inches, in bredth three, and in thicknesse one; yet they are somewhat broader above than under. They are smooth in the gibbous part, but unequall in the hollow

Their figure.

Their connexion.

Their bignesse.

Their parts

low part, to let in and out some vessels.

The parts are two, to wit, the externall and the internall; the externall are the membranes; these are two.

Their membrans

The one is common and externall, borrowed from the *peritonaeum*; within the reduplication of which, the whole kidney is lapped; and therefore it is called *renis fascia*. This membrane is compassed with copious fat; so that the kidney seemeth to be the fattest of all other intrals, according to *Aristotle*, 3. *Histor Animal.* 17. Although each one be exceedingly fat, yet some part of the kidney will remain uncovered about the middle.

The uses of the fat of the kidneys,

This fat about the kidney hath a threefold use. First, it is in stead of a pillow.

Secondly, it receiveth as a sponge the excrements.

Thirdly, it furthereth and keepeth in the heat

Before you deprive the kidneys

of

of this *tunica adiposa* with your nailes, about the upper part of the kidney, you are to observe a large glandule, which hath a sprig from the emulgent vein and artery, for nourishment, about the middle of it.

*Renes succenturiati.*

Their figure.

In figure it representeth a halfe moone, and is not unlike a kidney; from whence it is called *ren succenturiatus*. There is one on each side in the upper part of the kidney, resting upon the *tunica adiposa*.

It is strongly tied to the *septum transversum*.

Their connexion.

The substance of it is more flaggy than that of the kidney.

It hath nerves from the *plexus retiformis*, or net-like texture, framed of the twigs of *nervus costalis* and *stomachicus*.

Their nerves.

It seemeth to be framed, partly to fill up the vacuity which is between the kidneyes and the *diaphragma*; partly to be a pillow to the the stomacke, in the place about the emulgent veine and artery.

Its uses.

E

The

The proper membrane of the kidneyes.

Their internall parts.

The color of them.

Their substance.

The emulgent vessels.

The second membrane is that which is internall and proper. This springeth from the common coat of the vessels which enter into the kidneyes; for as soon as the vessels approach to the kidney, they leave their externall coat. It can hardly be separate from the substance of the kidney.

The internall parts are those which are contained within the proper membrane. In these, sundry things are remarkable.

First, the colour of the kidney, which is very red.

Secondly, the substance of the kidney, which is thick, hard, and compact as the heart almost, but not so fibrous.

Thirdly, the dispersion of the emulgent vessels throughout it; first, they enter by paires into the hollow part of the kidney; then each branch is divided into foure or five lesser branches, and these again into lesser, untill at the last they become capillar.

These being spread sundry ways  
thorow

thorow the substance of the kidney, towards the gibbous part, at last they end at the tops of the *Caruncula papillares*, or teat-like fleshy substances, into the which they poure the serosity of the blood, that it may passe thorow the *tubuli*, or water pipes, to the *infundibulum*.

The fourth is that which is called *pelvis*, or *infundibulum*, the tunnel, which is nothing else but the ample cavity of the ureter within the kidney.

Fifthly, the *tubuli*, or *fistula ureterum*, the water pipes of the ureters offer themselves, which are most commonly in number ten; foure in each end, two being still joyned together, and two in the middle, according to the number of the *carunculi papillares*. These are placed in the arched part of the *infundibulum*. Now the ends of the pipes about the *infundibulum* are called *cribrum*, or, the sieve. These water pipes, proceeding from the *infundibulum*, become a little  
E 2 wider,

wider, and end in the gibbous part of the kidney, with a wide round mouth receiving the *caruncula papillares*, by the which their mouths are stopped, and the watrishnesse of the blood issueth out into them, as milk out of the teats.

Sixthly, *Caruncula papillares* are to be considered. They are small fleshy bodies, somewhat harder than the substance of the kidney, resembling the teats of womens paps, from whence they have their denomination; they are of the bignesse of a pease, somewhat broad above, below round. If you divide them through the middle, you shall perceive a smooth haire-like passage from the top to the end.

They are in number answerable to the number of the *tubuli*, which receive them.

How these  
parts are  
to bee  
found out.

To find out these parts before named, you must divide the kidney in the hollow part, putting a thick probe into the *pelvis*.

Incision being made to the *fundibulum*

*fundibulum*, first you shall see the *tubuli*, then the *Carnacula papillares*.

The kidneyes have two sorts of veines.

Their vessels.

First, the two called *adiposa*, because they are spread through the *tunica adiposa*, and are covered with the fat, and afford matter for the fat. The right of these springeth from the emulgent veine; but the left from the *vena cava*.

Secondly, the two *emulgentes*, so called from their action. These are large, and spring from the trunk of the *vena cava*, descending between the first and second *vertebra* of the loynes. These being carried transversly, are implanted into the hollow part of the kidneyes, being divided into two branches.

The left is somewhat higher, as also the left kidney; but the right is somewhat longer. It hath a valve to hinder the return of the serosity to the trunk of the *cava*.

How mat-  
ters gath-  
red in the  
cavity of  
the brest  
are di-  
charg'd  
into the  
ureters.

The arte-  
ries.

The nervs

*Fallopins* was of this mind, that  
a<sup>o</sup> branch of a veine passeth from  
the *vena sine pari* to the left kid-  
ney, by the which quittour and  
water may be discharged by urine.  
But it is more probable, that these  
matters are first drawne in into the  
trunk of the *aorta*, by its incon-  
spicuous pores, and from thence  
sent to the kidneyes by the emul-  
gent arteries.

These are in number two, one  
in each side which accompany the  
veins to the kidney slope-ways.  
Whither when they are come, they  
are divided in two branches,  
whereof the one is implanted in  
the lower, the other in the upper  
part of the hollow part of the  
kidney.

The nerves on each side spring  
either from *ramus stomachicus*,  
and that is but one and small, and is  
spread thorow the proper coat; from  
hence ariseth the consent be-  
tweene the kidneyes and the sto-  
macke. So that vomiting is trou-  
blesome in nephriticall diseases.

One



One may think that nature hath afforded arteries larger than was requisite to afford life to so small bodies as the kidneyes are; but it was fit so to be, for the passages were to bee patent, which were to discharge the heart and arteries of serosity.

The artery lieth betweene the veine and the ureter; partly to hasten the blood to the kidney, partly speedily to discharge the watrishnesse.

The veines and arteries are not joyned with the water pipes; for if you put a catheter into the ureter, by blowing the vessell will not swell.

The place  
of the ar-  
terie.

CAP. XVIII.

Of the Ureters.

**T**He ureters, in Latin *meatus urinarii*, are called in Greeke *ὑπερῆρες*, either from *ὑπερ*, to pisse, or *ἔν τῇ ὀρῇ πρέσει*, because they keepe the urine.

Their  
number.  
Their sub-  
stance.

There is one in each side.  
They are white vessels, like to  
veines, yet they are whiter thicker,  
and more nervous. They reach  
from the kidney to the bladder.

Their  
coats.

They have two coats, the one  
common, from the *peritonaeum*;  
the other proper, from the exter-  
nall or common coat, it hath ca-  
pillar veins and arteries.

Its fibres.

It hath few oblique fibres, but  
most straight. It springeth from  
the bladder, for it cannot be se-  
vered from it easily, as from the  
kidneyes.

How the  
ureter dif-  
fereth  
from the  
bladder.

Yet it differeth from the bladder  
in two things.

First, in that the bladder hath  
three coats, but it only two.

Secondly, the bladder hath  
all sorts of fibres, but the ure-  
ter hath most straight, few ob-  
lique.

They are inserted in the backe  
and lower part of the bladder,  
not farre from the muscle sphin-  
cter, betweene the two proper  
coats of it, about the length of an  
inch.

This

This insertion is oblique to hinder the regurgitation of the urine, when the bladder is either compressed or distended with urine. Although the ureter doth not ordinarily exceed in compasse a barley corne, yet when stones doe passe, it becommeth sometimes as large as a gut.

Why the insertion is oblique

CAP. XIX.

Of the bladder.

THE bladder is seated in the *hypogastrium*, in the place called *pelvis*.

Its place.

Of substance it is membranous, because it was to admit large stretching,

Its substance.

The membranes of it are three. The first is from the *peritonaeum*; for it is lapped within the reduplication of it.

Its membranes.

The second is thicker, and endued with many straight fibres, which *Aquapendens* will have to be

bee a muscle serving for the compression of the bladder, as the sphincter serveth for constriction.

The third and innermost is white and bright, of exquisite sense, as they can witness who are troubled with the stone.

It hath all sorts of fibres.

Within it is covered with a mucous crust, an excrement of the third concoction of the bladder. This doth mitigate the acrimony of the Urine.

Its fibres.  
Its crust.

It is perforate in three parts, to wit, in the sides, where the ureters are to let in the urine, and before to let out the urine.

Its perforation.

The bladder hath two parts, to wit, the bottome and the neck.

Its parts.

Both these in figure represent a peare.

Its figure.

How it is upholden.

The bottome is upholden by the navell: First, in the middle by the ligament called *urachus*, which is the cause sometimes, that they who have a great stone in the bladder, complain of great paine about the navell.

Se-

Secondly, by the umbilicall arteries dried laterally.

If the bladder were not suspended, a man going straight up, the bottome of the bladder would compresse the neck, and cause difficulty in making water.

In man it lieth between the *os pubis* and the *intestinum rectum*. In women, between the neck of the matrix and *os pubis*.

The bladder of man differeth from the bladder of beasts in two things. First, the bladder in man is couched within the reduplication of the *peritonaeum*, but in beasts it is loose, and onely is tied to the *intestinum rectum*.

Secondly, the bladder of man hath fat without, but the bladder of beasts none.

In it stones are promptly engendered, because the heat of it is compact: so red hot iron burneth worse than the flame of fire.

There is a great consent between the bladder and kidneyes. So that in diseases of the kidneyes, difficulty

Why mans bladder is suspended.

Its seat in man and woman.

How the bladder of man differeth from the bladder of beasts.

Why stones are ingendred in it.

Why there is a consent between the bladder & kidneyes.

culty in making water sometimes happeneth. The causes of this consent are two.

First, the communion of office, for both serve for the excretion of urine.

Secondly, the similitude of substance; for both the inside of the kidneyes and the bladder are membranous.

An obser-  
vation,

Why the  
bladder in  
man is big.

One thing is to be noted, that a bladder is bestowed onely upon such creatures as have bloody lungs, and the hotter the lungs are, the bigger the bladder is.

So man, according to his stature, hath of all living creatures the biggest bladder; according to *Arist. Lib. 1. Histor. Animal.* Because the bladder is of a cold temperature, therefore in deadly diseases of it, sleepiness oppresseth the Patient, according to *Hippocrates, 6. epidem.*

The mus-  
cle spin-  
cter.

In the necke onely the muscle *sphincter* doth offer it self to be considered: whereof read in the doctrine of muscles.

It

It hath veines and arteries called *Hypogastrice*, implanted on every side of the neck, which are immediately divided into two branches; whereof the one is bestowed upon the bottome, but the other upon the neck.

Its vessels.

It hath remarkable nerves; partly from those of the sixth conjugation, which passe by the roots of the ribs, partly from those which spring last from the *os sacrum*.

Its nerves.

The use of the bladder is to containe the urine, like a chamber pot, untill the time of excretion come, when the bladder is full.

Its use.

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C A P. XX.

*Of the generation  
of blood.*

**F**irst of all, every nourishment receiveth a preparation in the mouth. If it bee solid, it is chewed by the teeth, from the mouth by swallowing, it is turned to the stomach.

How the  
*chylus* is  
made.

mack. It being embraced by the stomach, and kept for a while, is turned into *chylus*, partly by the specificall heat of the stomach it selfe; partly by the heat of the adjacent parts; but chiefly of the liver, spleen, and caul.

The *chylus* being made light by concoction, it riseth up, and passeth to the *pylorus*, and procureth the opening of it. This being opened, the stomach by its transverse fibres, thrusteth the *chylus* into the *duodenum*. From hence it passeth more and more downwards by degrees. The wrinkles of the small guts hinder the sudden passage of it, to procure an equall concoction of all the parts of it.

In the meane time the *vena lactea* draw from the small guts, whatsoever is alimentary of the *chylus*. While the *chylus* thus passeth to the liver, and is come to the divarication of the *vena porta*, the spleen by a naturall faculty by the *ramus splenicus*, draweth to it selfe the thickest and most terrestriall part,  
yet



yet the purest onely may come to the liver.

When the *chylus* is come to the liver, the choler is sent either by *meatus cysticus*, to the gall, or to the *jejunum*, by *meatus hepaticus*.

The blood being perfected, the grosser part is carried by the branches of the *vena porta*, and the splenicall to the nourishment of the parts appointed for nutrition; but the purest part is carried to all other parts for their nutrition: and because much watrishnesse is mingled with the blood, that it may passe without difficulty, by the narrow passages of inosculation, to the *vena cava*, (seeing the serosity is unapt to nourish) it is sent by the emulgent veins and arteries to the kidneys, and from thence by the ureters to the bladder.

## CAP. XXI.

*Of vasa preparantia  
in Man.*

**H**itherto wee have handled the parts appointed for nutrition: Now it followeth to run thorow the parts ordained for generation to continue man-kind.

The differences of the genitals.

The genitals are of two sorts; of the male and female, and so it was requisite for procreation; for this action requireth an agent and patient: seed and menstruall blood.

The first is the palace of the plasmatick spirit. The second affordeth supply of matter to the spirit, to draw out the admirable frame of the regions and parts of the little world.

The parts of the genitals in man.

In man some of these parts afford matter for the seed, to wit, the foure *vasa preparantia*: some elaborate this matter, the *corpus vericaesum*: some make the seed fruitfull, as the stones; some carry the seed

seed back againe, and make it pure, as those which are called *vasa deferentia*: some containe the seed, and an oleaginous matter, as the *vesiculae seminales*, and the *prostates*; some discharge the seed into the matrix: this is done by the *penis*.

*Vasa preparantia*, which prepare matter for the seed, are of two sorts, veins and arteries.

*Vasa preparantia.*

The veins are two. The right springeth from the trunk of the *vena cava*, a little under the emulgent.

The left proceedeth from the emulgent.

The arteries spring from the trunk of the *aorta*; these vessels being a little distant one from another, are tied together by a thin membrane, which springeth from the *peritonaeum*, and meet often by the way by inosculation. These vessels are greater in men than in women, and the arteries are bigger than the veins; because much heat and plenty of spirits are required for

The arteries.

for the seed. They enter into the groyne obliquely, carried together with the muscle cremaster, between the two coats of the *peritoneum*.

In curing of a rupture by incision, if the muscle cremaster doe fall out to bee bound by the ligature, *Spasmus cynicus* ensueth.

The ending of the vessels.

These vessels doe end about the beginning of the testicles, and from hence are called *emissaries*, and make up that part which is called *corpus varicosum*, *parastata*, & *plexus pampiniformis*. From the stones to it many small fibres passe.

*Corpus varicosum*.

The *corpus varicosum* is framed of the twisting of the *vasa preparantia*; which maketh a long, thick, *glandulus*, but hard welt, without any remarkable cavity, which passeth to the bottom of the stone, and from thence to the *vas differens*, where it endeth.

Here the venall and arteriall blood being elaborate in these admirable windings, is further prepared,

pared, a quality being imparted from the seminificall faculty of the stones.

C A P. XXII.

*Of the stones.*

**T**He stones in Latine are called *Testes*, because they testifie one to be a man.

They are glandulous bodies, flaggie, soft, and white, without any cavity, full of small veins and arteries, such as are not in any part of the body.

They are in number two, and therefore in Greeke are called *διδυμοι*.

Their figure is ovall, the right is hotter, and better concocteth the seed: Wherefore by *Hippocrat.* it is called *ἀρρενοειδής*, a begetter of the male.

The left stone is more full, and hath a bigger veine; yet the seed, which is there elaborate, is more waterish,

Their substance.

Their number.

Their figure.

watrish, and colder, because it proceedeth from the emulgent, and and is called of *Hippoc*, *ὑπάλγος*, because it begetteth the female. In the stones there are to bee considered their coats, substance; and use.

Their  
coats.

Their coats are foure.

First, *bursa scroti*, and it is nothing else but the skin couered with the *cuticula*: And because it cleaveth firmly to the *Membrana carnosæ* under it, so that they seem to make but one coat, it commeth to passe that in cold it doth contract it selfe, and becommeth wrinckled.

The line.

In the lower part it hath a line, according to the length, whereby it is divided into the right and left side; this line is called *sutura*, or a seame.

Secondly, it is called by *Rufus*, *dartos*: because it may easily bee flead from the *tunica vaginalis*: by the Ancients it was called *erithroides*, because it appeareth to be red, by reason of the fleshy fibres, where

wherewith it is enterlaced,

This ariseth from the *membrana carnosā*; which here is more thin and subtile than elsewhere, and stored with veins and arteries.

The third is *elythroides*, or *vaginalis*; because it containes the stone as a sheath. It is a thicke and strong membrane, having many veines. In the outside it is uneven, by reason of the fibres by the which it is tied to the *dartos*; but in the inner side it is smooth. This is nothing else but the production of the *peritonæum*.

The fourth is *ὄμιν νευρώδης*, the nervous membrane, called *albuginea*, from its colour. It is white, thick, and strong, framed of the externall tunicle of the *vasa praeparantia*. It is immediately wrapped in the stone; betweene these two the water is contained in *Hermia aquosa*.

The substance is described in the beginning of the Chapter. Each stone hath one muscle called *cremaster*, from *κρεμάω*, or *κρεμάζω*, which

is to hold up; because it pulleth up the stone in the act of generation, that the vessels, being slack-ed, may they more readily voyd the seed.

This muscle is nothing else but the lower part of the oblique muscle, ascending neere to *os pubis*, which outwardly wrapping the production of the *peritoneum*, is carried to the stone.

These muscles in sicknesse and old age become flaggy, and so the *scrotum* relaxeth it selfe, and the stones hang low.

The uses of the stones are three:

The first is to elaborate the seed by reason of the feminificall faculty resident in the *parenchyma* of the stones; for they turne the blood, which is brought by the *vasa preparantia*, into seed, for the most part; the rest they reserve for their own nutrition.

The second is, they add heat, strength, and courage, to the body, as gelding doth manifest, by the which all these are empai red.

Thirdly,



Thirdly, they receive the superfluous humidity of the seed, by reason of their glandulous substance.

C A P. XXIII.

*Of the vessels that carry the seed, and those that keep it.*

**V***asa deferentia*, the vessels which carry the seed, in colour they are white, in substance finewy, having an obscure hollownesse; from hence they are called *meatus seminales*. They spring from the lower end of the *parastata*. These mount up by the sides of the *Vasa preparantia*.

When they are come within the cavity of the belly, they turne back again, and passe to the back-side of the bladder; betweene which and the *intestinum rectum* they passe untill, about the neck of the bladder, being somewhat severed, and at last being joyned together, but not united, are inserted  
on

*Vesicula  
seminales.*

Their substance.

on each side in the glandulous bodies called *prostate*.

Before they come thither they are joyned to the *Vesicula seminales*. These in figure represent the cels of a Pomegranat, or honycomb.

These continue an oily and yellow substance, for they draw unto themselves that which is fatty in the seed.

They are more in number, that the oleous substance should not forcibly and plentifully be poured into the *urethra*, but should gently and slowly passe from one unto another by windings, and at last be poured into the conduit of the yard by a hole which is shut up with a fleshy substance, partly to stay the involuntary effusion of it, partly to hinder the regurgitation of it. It being poured into the *urethra* chiefly in the time of carnall copulation, doth moisten it that it shrink not, and suffereth it not to be offended by the acrimony of the seed or urine. The

*Vasa*

*Vasa deferentia* passing by these, goe to the glandules called *prostate*, by the which they are compassed.

When they are come to the *urethra* a caruncle, as a valve, is set before the orifice of each of them; partly to hinder the comming of the urine into them, partly to hinder the involuntary effusion of the seed.

The use of the caruncle in the urethra.

Under and by this caruncle on each side there are three holes, thorow which the seed passeth into the urethra. These holes are discerned easily in a gonorrhea inveterate, although not so easily in a sound person.

The holes by which the seed passeth to the urethra.

The seed doth passe thorow these inconspicuous passages, as quicksilver thorow leather, by drops. The seed having beene made subtil and spirituous by sublimation thorow the *Vasa deferentia* ascending, is able to passe thorow inconspicuous passages.

*Prostate*, or *glandula seminales*, are glandulous bodies, placed be-

*Prostate.*

F tween

tween the neck of the bladder, and the *intestinum rectum*. Although there is no conspicuous passage by the which the seed passeth into the urethra; yet the thick membrane which wrappeth in the prostate, where it leaneth upon the urethra, is thinner, and hath many pores, which are dilated by heat in the act of generation, and may be seen in an inveterate gonorrhea.

A continuall dilatation of these procure an uncurable gonorrhea.

The sphincter of the bladder compasseth these glandules. In drawing of a stone, if these parts be torne, the party becommeth barren.

*Perineum.*

Why these parts in man are hairy.

The distance between the root of the *cod* and the *podex* is called *perineum*, because it is still moist with sweat. The *pubes*, *scrotum*, & *perinaum* in men, are furnished with haire, because glandules are placed there, which receive plenty of superfluous moisture: a part where

whereof they send to the skin for the generation of haire. If the seed chance to be corrupted in man it causeth not so fearefull symptoms as in a woman, because the seminary vessels are without the *hypogastrium* in man, but in woman within.

Why corrupt seed is worse in a woman than in a man.

CAP. XXIV.

Of the Tard.

**I**T is called in Latin *Penis*, *à pendendo*, because it hangeth without the belly; and it is an organical part, long and round, yet somewhat flat in the upper part, seated about the lower part of *os pubis*, appointed for making of water, and conveying the seed in to the matrix.

The description of it.

It is framed of such a substance as might admit distention and relaxation.

The parts of it are either common or proper.

Its parts.

Why it  
hath no fat

The *cuti-  
cula* and  
*cuiis*.

The *mem-  
brana car-  
nosa*.

The inter-  
nall parts.

The two  
bodies.

The common are three, the scarfe-skin, the skin, and the *membrana carnosa*.

It hath no fat, for it would have hindered the stiffness of it.

The *cuticula* is of a reasonable thickness: the skin is somewhat thick, flaggy, when there is no erection, but stiffe when there is.

The *membrana carnosa* is somewhat sinewie.

The proper or internall parts are these: The two nervous bodies, the *septum*, the *urethra*, the glans, foure muscles, and the vessels.

The two bodies are long, hard, and nervous. These within are spongi-ous, and full of black blood. The spongi-ous substance seemeth to be a net-like texture, framed of innumerable twigs of veines and arteries.

This black blood, contained in these laterall ligaments, being full of spirits waxen hot by the sting of *Venus*, doth distend the parts.

These

These two laterall ligaments, where they are thick and round, spring from the lower part of the share bone. In their beginnings they are separate one from another, and represent the two hornes of *Pythagoras* his Y, that the urethra may passe between them.

Their beginning.

But as soon as they come to the joyning of the share bone, they are by the *septum lucidum* everted. It is nervous and white.

*Septum lucidum.*

It ariseth from the upper part of the commissure of the *os pubis*, and upholdeth the two laterall ligaments and the urethra, as a stay. The like is found in women to uphold the *cunius*. Under these lieth the urethra.

The urethra.

It is of a substance nervous, thick, loose, and soft, like to that of the laterall ligaments. It beginneth at the neck of the bladder, yet it doth not spring from it, but is joyned to it only, and so passeth to the glans. If you boile the bladder and it, it will separate it selfe from the bladder.

Its frame.

It is framed of two membranes, the one is internall, with the which the glans is covered; it is bred of the thin membrane which covereth the nerves of the prick. It is of an exquisite feeling, that it might feele the acrimony of the seed, and cause pleasure; chiefly in that part of it which lieth between the prostates.

The externall is fleshy, and hath many fleshy, transverse fibres. The middle substance is fungous, and full of black blood, that it might suffer distention and relaxation with the laterall ligaments.

At the beginning of it there are three holes, one in the middle largest, and two lesser, in each side one, from the passage which is sent from *vesicula seminales* to the urethra.

Its muscles.

The muscles are two in each side, and so foure in all. Of these collaterall muscles, the one is shorter and thicker, and springeth from the *appendix*, or knob of the *covenant*, under the beginning of the laterall



laterall ligament, and ascending obliquely, is inserted into the same, a little below the beginning of it; this serveth for erection.

The second is longer and smaller, proceeding from the sphincter of the *anus* fleshy.

This passeth straight under the urethra, and is inserted about the middle of it, in the side of the prick. These two muscles dilate the lower part of the urethra for miction and ejaculation of the seed. As the first muscle is termed *erector*, so this is called *accelerator*, or hastener.

This hath a substance agreeable with that of the *penis*; for this in erection is drawne towards its beginning, and the erection ceasing, it becommeth lank.

Glans is the extreme part; it is somewhat round, compassed with a circle, as with a Garland. It is soft, and of an exquisite feeling, by reason of the thin skin, with the which it is covered. About the

root of it, where it is joyned with the nervous bodies, there is a little pit : In the which if any sharp humour belodged, as in *gonorrhæa virulenta*, great paine is caused.

*Præputium*

The Glans is covered with *præputium*, the fore skin ; it is framed of the reduplication of the skin.

*Frænum.*

The ligament by the which it is tyed to the glans in the lower part of it, is called *frænum* the bridle.

The vessels.

Of the vessels, some are cutaneous, some passe to the inner parts of *penis*.

The *Cutaneous* veines and arteries spring from the *pudenda* ; these entering at the root of the prick they passe by the sides toward the back of it, and are conspicuous enough. The vessels which bestowed upon the inner parts of *penis*, come from the *Vena* and *arteria hypogastrice*, about the roots of the laterall ligaments. Here the arteries are remarkable, which are wonderfully dispersed through the body of the *penis* : for the right artery

artery is bestowed upon the left side, and the left upon the right side.

It hath two sinewes from the *os sacrum*. The lesser is bestowed upon the skin: The largest mounting up under the share bones to the root of the yard, betweene the laterall ligaments, it is bestowed upon the muscles, the rest of the body of the *Penis* and the glans.

Its sinewes

## Of the Genitals in Woman.

### CAP. XXV.

#### Of the *Cunnus*.

THE Genitals in a Woman have foure distinct parts; to wit, the *Cunnus*, the matrix, the stones, and the spermatick vessels.

*Cunnus* is that part which offereth it selfe to the sight before section. In it eleven particles are remarkable.

The particles of the *CUNNUS*

1 *Tubes*, that particle where

F 5

the

the haire doth first bud out; which ordinarily falleth out the fourteenth yeare of a womans age; the upper part of this which buncheth out, and is most hairy, is called *Veneris mons*.

2 Is *Rima magna*, the great chink; it beginneth at the *os pubis*, and is but an inch distant from the *anus*. Wherefore it is larger than the cavity of the neck.

3 The *Labia* or lips, by these the internall parts are covered, as the tongue and teeth by the lips. These are framed of the common integuments of the body, these have pretty store of spongyous fat.

4 Are the *Ala*, or *Nympha*, the wings; these appeare when the lips are severed: These are two productions framed of a soft and spongyous flesh, and the reduplication of the *Cutis*, placed at the sides of the neck: Being joyned above, they compasse the *Clitoris*. In figure and colour they resemble the comb of a Cocke.

5 Is *Clytoris*, this is a nervous and

and hard body : within, full of a black and spongiouse matter, as the laterall ligaments of the yard. It is framed of three bodies. The two laterall are ligaments, and spring from the internall knob of the *Ischium*. The third is betweene these, this ariseth from the joyning of the *os pubis* ; at the end of it is the glans, which hath a superfici- all hollownesse, and is covered with a very thinskin, as a *Prepu- tium*, which springeth from the joyning of the *Nympha*. And as it doth represent the prick of a man, so it suffereth erection, and falling ; It may be called a wo- mans prick. In some women it hath been as big as a mans.

6 Under the *Clytoris* above the necke a hole is to be seene, by the which a woman maketh water.

7 After the *Nympha* foure car- runcules, resembling the leafe of the mirtle shrub, are to be seene : Whereof that which is uppermost, is largest and forked, that it might receive the end of the neck of the bladder,

bladder, the other is below : The other are on the sides. All foure keepe back the ayre, and all other things, from entring into the cavity of the neck, and by tickling the genital of man cause the greater delight. In women which have not borne children, they are most conspicuous.

These caruncles are framed of the reduplication of the fleshy neck of the genital.

8. Behinde the caruncles appeareth a cavity in the lower part of the neck of a reasonable largenesse, framed by nature to stay the seed powred into the neck from too quick slipping out.

9. In Virgins these caruncles are joyned together by a thin and finewy membrane interlaced with small veines, cleaving orbicularly to the sides of the neck, having a small hollownesse in the middle, which will receive a pease, by the which the mensstruall blood passeth : Sometimes it is hollow like a five, it is called *hymen*.

10 Behind these caruncles and the hymen appeareth a chink, under the orifice of the bladder betweene the two wings, which is the entrance into the neck.

11 Now the neck is nothing else but that distance, which is between the *Cunus*, and the mouth of the matrix.

In women of an ordinary stature, it is eight inches in length.

The substance of this part is hard, without fleshy, within membranous and wrinkled, like to the inner skin of the upper jaw of a coves mouth.

First, to cause greater pleasure in the act of generation.

Secondly, the better to retaine the seed.

Thirdly, to admit the greater dilatation in travell.

The neck is seated in that cavity of *hypogastrium*, which is called *pelvis*, betweene the bladder and *intestinum rectum*. It hath two membranes; if you cut them transversly, you shall perceive between them

The neck.

Its length.

Its substance.

Its seat.

them a spongiouse flesh : such as is found in the laterall ligaments of the *Penis*. This causeth it to swell in the act of generation, innumerable sprigs of veines and arteries affording plenty of spirits.

Its vessels.

The hypogastricall veines are inserted into the neck of the matrix : from thence passing to the mouth of the matrix. As soone as they come to bee implanted into the substance of the *uterus*, they lose their owne coats, which are bestowed upon the first membrane of it. From thence by small pipes (such as are found in sponges but wreathed) blood is carried to the matrix : by these veines the termes issue into the necke of the genital.

A large branch passeth from *arteria hypogastrica* to the necke. A sprig of it, but wreathed, is communicate to the testicle, passing thither betweene the two membranes of the body of the matrix : This sprig is winded to hinder it from ruption, when the matrix is enlarged,



enlarged, a woman being with childe.

C A P. XXVI.

Of the Matrix.

**T**He Matrix was appointed by Nature to be the field of Nature, to receive the seeds of man and woman, for the procreation of man, and the continuation of mankinde.

It hath two parts, *os uteri*, the mouth of the matrix, and *fundus* the bottome.

The mouth is a hole at the entrance of it, which like a mouth may be dilated, or pursed in: this entrance is but a transverse line, which when it is exactly opened becommeth round.

This orifice, although in the act of generation it may be so dilated, that it will receive the glans of a mans genitall; yet after conception it is so closely shut, that it will not admit the point of a bodkin.

When

The parts of it.

The mouth of it.

When a woman is delivered, it so openeth it selfe, that it maketh way for the infant, be it never so big. In those who have beene mothers, it is like to the mouth of a whelpe. The cancer of the matrix most commonly beginneth here, because it is somewhat fleshy: within this orifice a long knobby substance is placed, to helpe the shutting of the orifice the more exquisitely. About this knobby substance, small holes are to bee seene, which seeme to be the ends of the ejaculatory vessels.

Its figure.

In figure it is like a peare or a cupping glasse.

Its bignesse.

In virgin even of big stature it exceedeth not the bigness of a walnut. But in those who are with childe, it doth dilate it selfe into that capacity, as is able to containe the childe.

Why it is small.

It was to bee small, because the seed in quantity is but little, which it ought to embrace and cherish.

No distinct cels in it.

It hath no distinct cels, as the matrix of a beast hath; only a line, as in the tongue and cod, doth se-

parate

parate the right side from the left. In length from the orifice to the extremity of the bottome, it is thought to be three inches.

The internall superficies is rough the better to keepe the seed.

Its frame.

The matrix is framed of two membranes, the externall springeth from the *peritonæum*, and is the thickest of all other, that spring from it. It is smooth and slippery if you except those parts where the spermaticke vessels enter into the matrix, and where the ligaments goe out. The internall membrane is full of small holes, where the matrix covereth the *intestinum rectum*.

When the courses flow, they are easily seen; but not when they cease. The Ancients did take these to be the mouths of the veines and arteries.

And because they resemble in figure the measure appointed for the selling of vineger, they called them *Acetabula* or *Cotidænes*. By these holes the menstruall blood issueth.

*Acetabula.*

Above at the sides of the externall membrane two little bunches, such

*CORNA uteri.*

such as are seen in Stirks or Hayfers, when the hornes begin to bud are to be marked. They are called *cornua uteri*.

Its vessels.

For nourishment it hath both veines and arteries.

The veins

Of these the veines are bigger than the arteries: the veines spring from two branches on each side: one branch commeth from the *vasa preparantia*: this doth descend, and is spread thorow the whole matrix: but chiefly thorow the bottome: and seeing the sprigs are implanted in each side, the right are coupled with the left by inosculation.

The other branch, which commeth from *ramus hypogastricus*, doth ascend from the lower parts, and is sent partly to the orifice, partly to the bottome. These are larger than those which spring from the *vasa preparans*. Both these being dispersed thorow the substance of the matrix are united by inosculation also.

Some will have the menstruall blood

blood to flow from the twigs, sent from *Ramus hypogastricus* when a woman is with childe: being perswaded by the *Aphorisme* of *Hippocrates lib. 5. Aphor. 51.* that nothing can flow from the cavity, the orifice being so shut that it cannot admit the point of a bodkin; but the word *συνεμμεναι*, signifieth only *connivens*, or shut together, as the eye lids are. And although in the first moneths the orifice be exactly closed; yet when a woman is great with childe the orifice gapeth a little, and is shut with a mucous seminall substance, which doth repell the aire, and lubricate the orifice in the delivery.

It hath arteries also, which spring from the preparing arteries, and from the *hypogastrica*, as the veines did; these accompany the veines, and are distributed as they are.

The sinews first doe spring from the sixth conjugation: they are small, and are bestowed upon the bottome:

Arteries.

The sinews.

bottom : than from the pates which spring from the *os sacrum*.

These are bestowed partly upon the lower part of it, and partly upon the *Cunus*. These are larger, because in the act of generation great delectation is required.

By these vessels, arteries, veines, and nerves, the matrix hath a consent with all the rest of the body. And although the veines, and arteries seeme to be small in women which are not with childe : yet in those who are with childe, by the affluxion of blood, they will sometimes become as thick as a finger. Yea, in such the matrix, which otherwaies is membranous, as hath beene said, becommeth in the last moneths thicker and softer ; so that about the upper part of the bottom, unto the which the *placenta uteri* is tyed, it becommeth almost two inches thick.

The matrix is onely tyed to the adjacent parts laterally : for above, fore, and after, it is free ; that it might admit dilatation, and descend.

scend or ascend in the act of generation.

Now the ligaments are in number foure: The two uppermost, broad and membranous, are nothing else but productions of the *peritoneum*, which tie the matrix to the *ossa ilii*.

Its ligaments.

They are loose and soft, that they might admit dilatation with the matrix, when a woman is with childe, and constriction when she is not.

These carry the *vasa preparantia* and *deferentia* to the matrix, and lap up the stones: they represent the wings of a bat, or the sailes of a ship spread abroad. These keep the matrix steady in its own place, that it neither ascend nor descend.

The two lower ligaments are nervous, round, and hollow; they spring from the sides of the bottom of the matrix, nere to the *vasa deferentia*, which they touch; they goe downe to the groynes, by the production of the *peritoneum*,  
streng.

strengthened by the glandules: and being dilated like a membrane, they bestow one part upon the *clitoris*: the residue passeth to the knee, in the inside of the cheigh by the *membrana adiposa*: this is the cause why women after conception feeble paine in the inside of the cheigh.

These ligaments serve not only to stay the matrix, but because they are hollow; by them noysome humors of the genitals are sent to the glandules of the groynes. So after impure copulation, the seminary vessels being infected, the contagious humor, by these ligaments is sent to the groynes; from whence arise *bubones veneri*.

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## CAP. XXVII.

*Of the stones, and the seminary vessels.*

**V**Women have stones as men have; but they differ



fer in eleven things.

1 In situation; for they are placed not without the *hypogastrium*, as in men; but within it: that they might bee the hotter and more fruitfull.

2 In quantity; for they are lesser.

3 In their frame; for they are composed of five or sixe bladders, which make them uneven; whereas the stones of men are smooth: these bladders containe an humidity like to whey; but it is thicker.

4 The stones of women have no *cremasters*; but are stayed by the broad laterall ligaments, called the bats wings.

5 They have no *prostates*.

6 They differ in figure; for in man they are ovall, but in woman flattish.

7 They have but one membrane; whereas mans have foure.

8 In substance; for they are more soft and flaggie than in man.

9 In

The differences between the stones of a woman & of a man.

9 In temperature ; for they are more cold than mans stones, and containe a thin and waterish seed.

10 In women they are tyed to the sides of the *uterus*, by the two upper ligaments, which are loose and membranous.

11 In women which are not with childe, they are placed above the matrix, two inches distant from it.

Its veins.

The seminary vessels preparing, are foure ; two veins, and so many arteries.

The vein of the right side springeth as in man, from the trunck of the *vena cava* under the emulgent ; but that of the left side springeth from the middle of the emulgent of the same side.

Its arteries

Both the arteries spring from the descending trunck of the great artery. These veins are not united as in man, before they come to the stones, but are divided into two branches. Whereof the greater being stayed by the membranous ligament,

gament, is carried to the stone; but the lesser endeth in the bottome of the matrix in the upper part, for the nutrition of the matrix, and the embryo.

These *vasa preparantia* differ from those in men in these things.

First, they are shorter than in man, by reason of the shortnesse of the passage; but they have more wreathings where they make *corpus varicosum*, about the stone, that the seed may be the better prepared.

Secondly, they passe not whole to the stones as in man; but are divided in the mid way, as hath been said.

One thing is to bee noted, that the spermatick veins receive the arteries as they passe by the sides of the uterus, that the blood might be the better elaborate; for if you blow up the *vena spermatica*, both the right and left vessels of the matrix are blowne up. From hence you may perceive the communion of all the vessels of the matrix.

The difference betweene these and those in men.

An observation.

*Vasa defc-  
rentia.*

*Tuba Fa'lo-  
piana.*

The *Vasa deferentia* spring from the lower part of the stones. They are firme, white, and nervous. They passe by the membranous ligament to the matrix, not straight, but wreathed; that the shortnesse of the way might be recompensed with the multitude of windings. Neere the stones they are somewhat broad: When they have marched a little, they become narrow, and about the matrix they become broad againe, and end in the *cornua* and capacity of it. Amongst these vessels, the last to be considered is *Tuba Fallopiana*. *Spigelius* calleth it *Vas cæcum*, lib. 8. cap. 20. because it hath but one orifice, as the *intestinum cæcum* annexed to *colon*; this springeth from the *cornua* or bunches, and resembleth the end of a trumpet, and passeth obliquely, over against the stone carried by the membranous ligament, and compasseth the stones: but it neither proceedeth from the stones, neither is inserted into them: And as in its beginning

it is open ; so in its ending it is shut.

*Riolan* will have it to be the end of the ejaculatory vessell, ending within the matrix. He observeth, that within it is to be seene a long, white, and sinewy body, which he will have to be the continuation of the ejaculatory vessell. He noteth also, that a small sprig doth passe, but wreathed, from the ejaculatory, by the sides of the *uterus*, to the orifice ; by the which women with child spend their seed in the act of generation : which *Spigelinus* denieth in the cited place, and checketh *Laurentius* for affirming such a passage.



THE SECOND  
**BOOK E**  
OF THE  
**B R E S T.**

**C A P. I.**

*Of the common containing  
parts of it.*

**H**itherto then of the lower belly, the seat of the naturall spirit, and of the parts appointed for nutrition and procreation : Now it followeth that we handle the middle cavity the seat of the vitall spirit, which containeth those parts appointed for the cherishing of the naturall heat, the distribution of the same

to all other parts of the body, and the cooling of it, if it exceed the naturall degree.

This ventricle is seated in the middle, betweene the uppermost, which is the head, and the lowermost, which is the belly: for it was fit, that it should be so, that the heat passing thorow all, and bestowing life, should equally be bestowed upon all the parts of the body.

The situation of it.

It is severed from the head by the neck; from the belly by the midrise. It is bounded in the forepart by the brest-bone, and cartilages. In the sides by the ribs: Behind by the *vertebra* of the back.

The limitation of it.

The figure of it is ovall, somewhat flat before and behinde, whereas in beasts it is somewhat sharp: So that onely man lieth on his back.

The figure of it.

It is partly bony, partly fleshy, that it might admit motion, and yet not stifle the heart; the fleshy parts being suspended by the bony.

The substance of it.

The parts  
of it.

The com-  
mon con-  
taining  
parts.

1. 2. *Cuti-  
cula.*

3. *Pinguo-  
do.*

The fore part of it is called *sternum*, the sides *costa*, and the hinder part *dorsum*. The parts whereof it is composed, are either containing or contained. The parts containing are either common or proper.

The parts containing common are in number foure, *Cuticula*, *Cu-  
tis*, *Pinguedo*, and *Membrana  
carnosa*.

The scarfe skin, and skin of it doe differ from those in the belly: for it is hairy under the arme pits, and above the pit of the heart: the skin of the back is both harder and thicker, & so is lesse hairy.

Secondly, the skin of the back-part is of an exquisite feeling: first, because many twigs of sinewes are bestowed upon it from the *Nervus*, proceeding from the *spinalis medulla*: secondly, by reason of the muscles of the brest placed there, which have many tendons, and so are very sensible.

As for the fat, it is not plenti-  
full here, as in the belly: first, be-  
cause



cause the naturall heat here is sufficiently preserved without it: secondly, because it would have hindred the motion of the brest. Onely here it is somewhat yellowish.

The *Membrana carnosa* here in the fore part of the neck is more fleshy than in other parts, chiefly where the *musculus quadratus* is framed, which pulleth downe the cheeks and lips.

4 The *Membrana carnosa*.

C A P. II.

Of the Dugs.

**T**HE proper containing parts are either externall or internall. The externall are in number three, the dugs, the muscles, the bones. The internall proper containing parts are three in like manner, the *pleura*, the *mediastinum*, and the *pericardium*.

The parts of the brest.

Dugs are granted to both the sexes; in men they are framed of the *cutis*, the *membrana carnosa*,

The paps of men.

G 4. fat,

fat, and the nipple, and serve onely for beauty, and are called *mammilla*.

If in man a whitish substance representing milk, be found in the nipples, which hath beene seene, as witnesseth *Aristotel. 1. Histor. Animal. 12.* it is unprofitable, and unapt to nourish.

The parts  
of the  
paps in  
woman.

The paps in women besides these parts, have remarkable vessels, glandules and pipes, to containe the milke perfected by the glandules.

The glandulous  
bodies.

The glandules are many, not one; that the milke might bee the better elaborated. There is placed above the rest one somewhat bigger under the nipple. Betweene these are placed innumerable veines and arteries, which receive blood from the matrix the materiall cause of milk.

When these are full of blood, the milk is made by the property of the substance of the glandulous bodies, and their temperament. The milke perfected is sent to the

*rubus*

*tubuli lactiferi* or conduits of milk, these end in the nipple.

The veins

The veins are of two sorts, for some are externall, some internall. The externall spring from the axillar branch, and are placed under the skin which covereth the dugs, to nourish it, and are called *Thoracica superiores*, or the uppermost breast veins. The internall or inferior called *mammariae*, spring from the *rami subclavii*. They are in number two, whereof one doth march downeward straight by the sides of the breast bone. When they are come to the *mucronata cartilago*, they passe out of the breast, and goe downeward by the lower part of the *musculi recti*. When they are come to the umbilicall region almost, they are joyned with skin, by sundry inosculation, with the *vena epigastrica*; which meet them there.

These *vena epigastrica*, spring from the externall *ramus iliacus*, and by a straight way passe upward under these muscles. From

this same branch, spring the *vena hypogastrica*, which are inserted into the necke and bottome of the matrix.

The arteries.

There are *arteria mammaria* in like manner, which spring from the *rami subclavii*, and goe downe to the navell. Whither when they are come, they are united by inosculation with the *Arteria epigastrica* ascending.

Nerves.

They have nerves from the fourth intercostall nerve, which about the middle of the rib, perforating the intercostall muscle, is divided into foure branches, which are sent afterward to the pectorall muscle, the thicker passing to the nipple.

The fat.

Betweene these glandulous bodies and vessels plenty of fat is placed, to procure smoothnesse and equality to the paps. If this be wasted either by sicknesse or old age, the dugs become flaggy.

The figure of the dugs.

The paps are of figure round, both that they should be more capable of milk, and lesse subject to brusing.

In.

In number they are two, that if one should faile, the other should supply the defect.

Their number.

In Men, Women, and Apes, which carry their young ones in their armes, they are seated in the brest.

Their situation.

1. That the mother should take pleasure by beholding the childe.

2. That by the talking of the mother, the childe should learne to speake, and bee endued with reason.

3. That being neere to the heart, they should receive plenty of heat.

4. For beauty.

5. For convenient giving of suck; for the child cannot presently goe when it is borne, but must bee born in the armes and applyed to the teat.

6. For the commodity of the act of generation.

7. For the defence of the vitall parts.

8. For the incitation of lust.

9. To ..

9. To bee a receptacle of excrementitious humours : So women are often troubled with Cancers.

Of the  
nipple.

The nipple is placed in the middle of the dug, where the milkie conduits end. It is a round body standing out, that the infant may take hold of it with the lips. It is of a fungous substance, that it may admit distention and contraction. It hath many holes; which appear when the milke is pressed out. It is rougher than the other parts of the dug, that the infant may the more firmly hold it. It is of an exquisite sense, that the nurse should finde some pleasure when shee giveth suck. It is framed of the reduplication of the skin.

What  
milk is.

Now the milke which is drawn thorow the holes of it by the infant, is nothing else but a white liquor, engendered of the venall and arteriall blood, sent from the matrix, and altered by the glandules of the dugs; in taste pleasant, which is easily concocted by the stomach,

stomack, and doth speedily and plentifully nourish.

As for the muscles, they are set downe in the Treatise of Muscles, Cap. 15.

The bones, which were said to be the third proper externall containing part, are set downe in the Doctrine of bones.

### C A P. III.

*Of the proper internall containing parts.*

THESE are in number three, the *Pleura*, the *Mediastinum*, and the *Pericardium*.

The *Pleura* hath its denomination from the ribs, under which it is placed, and so it may bee termed in English, the Costall membrane.

It is a membrane, white, thin, hard, resembling the *peritonæum*.

*Spigelius de human. corp. Fabr. lib. 9. cap. 3.* will have it to be thick-

er

Its substance.

er and stronger than the *peritoneum*, contrary to the opinion of *Riolan*, who affirmeth the *peritoneum* to bee thicker and stronger; because it is appointed for the sustaining the weight of the guts.

Its parts.

It is every where double: the inner part is thickest, smoothest, and as it were bedewed with a waterish humour, that it should not hurt the lungs by its roughnesse: This waterish humour doth spring from the vapours raised from the blood condensed, by respective coldnesse of the membrane. The outer part is thinner, yet rougher; that it should cleave the more firmly to the ribs.

Its figure.

As for its figure, without it is arched, within hollow: Above it is narrower, below broader, chiefly towards the sides: From it spring some sinewie fibres, by the which the lungs are tyed to it. If these be too strait, the motion of the lungs is hindered, and so an uncurable difficulty of breathing procured.

Its holes.

Above, it is perforate in five places,



ces, to give way to the *vena cava*, and the *aorta* ascending, the *gula*, the wind-pipe, and the nerves of the sixth paire. Below where it covereth the midriff, it is perforate in three places, to give way to *vena cava*, and the *aorta* descending, as also to the *gula*.

It is framed of the membranes, covering the *spinalis medulla*; for those joyning with the sinewes of the brest, growing broader, produce it.

It hath veins and arteries for nourishment and life; and nerves for feeling.

On each side it hath 12. veins; whereof the two uppermost spring from the higher intercostall branch, and the ten lower from the *vena sine pari*.

So many arteries are in like manner; whereof the foure uppermost proceed from the superior intercostall; and the inferior eight, from the hinder part of the *aorta*, descending.

It hath twelve nerves in like manner;

Its beginning.

Its vessels.

Its veins.

Arteries.

Its nerves.

manner; whereof the foure branches which spring from the *vertebra* of the brest, are bestowed upon the forepart; but the hindermost branches are bestowed upon the muscles, which are placed upon the back.

The seat  
of the ves-  
sels and  
the pleu-  
resie.

Its uses.

These vessels are placed between the duplication of the *Pleura*, and the pleuresie it selfe is not seated in this place only, but between the *Pleura* also, and the intercostall muscles. It hath two uses: First, to wrap in all the vitall parts. Secondly, to defend them from all externall injuries.

Of the  
*Mediasti-*  
num.

The second membrane is the *Mediastinum*; because it standeth in the middle of the brest, and divideth the right side from the left.

It hath not only a duplication as the *Pleura* hath, but is double also; for one is in the right side, the other in the left. They are united according to the longitude of the *vertebra* of the back; but severed towards the *sternum*.

In

In the cavity between these parts of the *Mediastinum*, one may bee deeply wounded, without any great danger of death. Such a wound you shall easily discern; First, if small store of blood issue out. Secondly, if no breath come out.

Observation.

This cavity is scene when the *Cartilago xiphoïdes* is removed. In the dropſie of the lungs, and when corrupt matter is gathered, the *ſternum* here may be tripaned.

The ſubſtance of it is membranous, yet thinner and ſofter than the *Pleura*. The innerſide towards the lungs is ſmooth, and hath fat about the veſſels; but the exterior is rougher, by reaſon of the fibres, by the which it is tyed to the *Pleura*.

Its ſubſtance.

It reacheth from the throat to the midriff.

Is large-  
neſſe.

As for its veſſels, veins and arteries, it hath from thoſe called *mammaria*, but ſmall, and from *vena ſine pari*.

Is veins.  
Its arteries

It hath one ſpeciall vein called  
*media-*

*mediastina*, which springeth from the lower part of *ramus subclavius*.

Its nerves.

The nerves called *stomachici*, passe by the reduplication of it. It hath three uses: First, it divideth the brest and lungs in two parts, that one being wounded, the other should be safe.

Secondly, it holdeth up the *pericardium* firmly, wherein the heart is contained, that it should not rest upon the back bone, when we lie upon our back; or that it should fall upon the brest bone when wee bend our selves towards the ground; or touch the ribs when wee lye upon our sides.

Thirdly, it giveth a safe passage to the vessels which passe by it.

Of the *pericardium*.

The third proper containing part is the *pericardium*, so called because it compasseth the whole heart, whose figure it hath, for it is pyramidall. It is so farre distant from the heart, as is sufficient to give way to the motion of the same, and the containing of the waterish humour.

It

It hath two membranes: 1. Outer from the *mediastinum*, it is tied before and behinde to the *pleura*; from whence both the *mediastinum* and *pericardium* originally spring. 2. Inner from proceeding from the externall tunics of the vessels of the heart: for within the *pericardium* the vessels lacke their common tunicle, it having beene spent upon the *pericardium*.

The externall membrane is fibrous; but the internall is slippery, but firme and thick. The motion of it is secondary from the heart.

It leaneth more to the left side than to the right, and more to the fore than back part. It cleaveth so firmly to the nervous circle of the midrife, that it cannot be separate from it without rending, to direct the motion of the heart.

It is perforate in five places. In two, for the enteriſg in and paſſing out of the *vena cava*. In three for *vena arterioſa*, and *arteria venoſa*, and the paſſing out of the *aorta*.

It

Its membranes.  
Its connexion.  
Its beginning.

Its ſituation.

Its holes.

Its vessels.

It hath small veines from the *phrenice*, and the axillar. No arteries appeare, because it is neere enough to the heart.

Its uses.

It hath two uses: First, to keep the heart in its owne place, whether wee bend our body backward, forward, or to either side.

Secondly, to containe the watrish humour, which is sundry waies profitable: for first, it tempereth the heat of the heart: Secondly, it moysteneth the same: Thirdly, it maketh it slippery: Last of all the *pericardium* defendeth the heart as an armour from all externall injuries.

The watrish humour in the *pericardium*.

The waterish humour which is contained in the *pericardium*, is like urine, yet not sharp or saltish. If it be thick and slimy, it causeth the heart to bee hairy. If it bee too copious, it causeth the panting of the heart, which is cured by phlebotomy. It is too plentiful in those who have obstructions of the mesaraical veines, liver, or spleene: for in such the thinnest part of the *chylus* onely

ly is drawn for nourishment, and so the blood becommeth watrish.

Some think it to proceed from a seminall aquosity, even from the first generation : as the aire within the eares is from a flatuous. Others thinke that it is ingendered of vapors raised from the blood, and waterishnesse of the veins and arteries of the heart, and condensed by the respective coldnesse of the membrane, and by this meane the *peritonaeum* and the *pleura* sceme alwaies bedewed with moysture.

It seemeth that the first beginning of it is a seminall humidity, and that is maintained afterward by the vapours.

Sometimes also there is contained in the capacity of the brest, a bloody water to moysten, and temper the heat of the lungs.

It is caused partly of the vapours raised from the vessels, partly of that portion of drinke, which passeth to the lungs : and by reason of this, water and blood did flow from the side of our Saviour pierced.

C A P.

Its generation.

The bloody water in the capacity of the brest.

## CAP. IV.

*Of the truncke ascending from  
the Vena cava.*

**N**OW the parts contained in the brest are either *vasa* or *viscera*, the vessels or the entrals.

The vessels are in number foure, the *vena cava*, the *vena arterialis*, the *arteria venosa*, and the *aorta* or *arteria magna*.

The *Vena  
cava*.

The first is the *vena cava*, or *magna*, because the hollownesse of it is great. It hath its beginning from the liver. The orifice of it is three times as large as that of the *aorta*: being received by the right eare of the heart, it is expanded into the whole right venticle of the same.

Its valves.

About the orifice of it are placed three valves called *trifurca* or *tricuspides*: because arising from a large foot, they end into a narrow top representing barbed arrowes.

Their situation is from without inward, so that the blood may be let



let in, but not returne. They proceed from a membranous circle, annexed to the orifice: They cleave to the *septum* of the heart; towards the point of it be strong fibres ending in round caruncles.

If you would see these as the rest of the valves, cut transversly the ventricles of the heart neere to the *basis*, and then they will appear.

It hath two trunkes, one descending, and this is that which is caused of a number of small veines, appearing in the hollow part of the liver, which meet about the middle of it in one trunk still decreasing in number, and encreasing in bignesse.

The trunk  
descend-  
ing.

The other ascending, this is procured by a number of small veins, springing from the convex part of the liver, which end in like manner into one trunk about the middle of it.

The trunk  
ascending.

This is bigger than the descending because all the upper parts are fed by this onely; whereas most of the

The laterall sprigs of the trunk ascending

1. *Phrenica*.

the parts contained in the abdomen, are nourished by the *vena porta*.

Although it be not divided into branches untill it come to the throat; yet it doth send forth sundry sprigs from the sides.

The first is called *phrenica*, one in each side. It is inserted into the *diaphragma*, which is called *epirus*, by a number of twigs, and from thence it bestoweth twigs upon the *pericardium*, and *mediastinum*.

The second is called *Coronaria*, so called because like a garland it compasseth the *basis* of the heart. It sendeth sundry twigs to the outer parts of the heart; but chiefly to the left: because it needeth greater store of nourishment, by reason of its stronger motion.

This hath a valve which hindereth the returne of the blood, to the *vena cava*. This springeeth from the *cava*, before it enter into the heart, and the blood is somewhat thick, and not attenuate in the ventricles of the heart; for the substance

substance of the heart, being hard, and firme, was to be nourished by blood somewhat grosse.

The third is called *αζυγος* or *sine pari*; without a mate; because it hath not a fellow as other veines have in the left side, if you except those beasts which chew the cud.

3. *Vena sine pari,*

This springeth from the *cava*, as soone as it is come out of the *pericardium*. It passeth out of the hinder and right part of the *vena cava*, about the fifth *vertebra* of the brest. It doth not descend straight way: But comming a little forward, it returneth towards the *spina*.

When it is come to the eighth or ninth rib above the *spina*, it is divided into two branches, to wit, the right and the left. Then passing by the division of the midriffe, which is betweene the two productions of it, they are spread thorow the abdomen. Of these two, the left is inserted into the left emulgent.

H

By .

By which  
way mat-  
ters in the  
breast are  
discharg'd

By this way *Fallopins* will have watrish, purulent and bloody substances to bee discharged, which sometimes are contained in the brest, while these branches march downeward: In each side ten sprigs bud out, which march thorow so many distances of so many of the inferior ribs.

In the lower part of the rib, there is a groop to recieve the sprig. Wherefore when you make incision in an *empiena*, come not neere to this part. From this veine other small twigs also proceed; which afford nourishment to the *Spinalis medulla*.

These are called *costales inferiores*, or the lower intercostals. The *vena sine pari* thus being framed, the *cava* ascendeth to the *jugulum*, strengthened by the *mediastinus* and the *thymus*; which is placed in the uppermost part of the brest.

The diva-  
rication of  
the *vena*  
*cava*.

Here the *vena cava* is parted into two remarkable branches: From whence all those veins spring, which are sent either to the head or armes.

On

One branch marcheth to the right, another to the left side: while they remaine within the brest, they are called *subclavii*, because they march under the cannel bones; but when they are come to the arm-pit, they are called *axillares*.

Before they come to the arme-pit, sundry sprigs spring from them.

The first is *intercostalis superior*, this ariseth from the root of the divarication; and passing by the root of two ribs, bestoweth twigs upon the distances of the two upper ribs, as the *vena sine pari* did: there is one in each side.

The second is called *mammaria*; this marcheth forwards towards the upper part of the bone of the brest. From thence it goeth downe by the sides of it: and when it is come to the *cartilago mucronata*, about the sides of it, it passeth out of the brest, and marcheth by a straight way under the straight muscles to the navill, where it is joyned with the *vena epigastrica*

Sprigs  
proceed-  
ing from  
the cava  
within the  
brest.

1. *Interco-  
stalis supe-  
rior.*

2. *Mam-  
maria.*

*ascendens* by inosculation : which is the cause of that great consent, which is betweene the paps and the matrix. This before it leave the brest, it bestoweth one branch upon the cartilaginous distances of seven of the *costa vera*, where the sprigs of the *vena sine pari* end. From these branches proceed some other remarkable twigs, which are bestowed upon those muscles, which are seated upon the brest, and the dugs.

3. *Mediastina.*

The third is called *Mediastina*, because it is bestowed upon the *mediastinum* together with the left nerve of the midrise, according to the length of it.

4. *Cervicalis.*

The fourth is called *Cervicalis* or *vertebralis*. It is large in each side, marching upwards obliquely towards the back part, it commeth to the transverse processes of the *vertebra* of the necke, where passing thorow the holes of them, it bestoweth branches upon the muscles, which ly above the *vertebra*.

The fifth is called *Muscula inferior*, because it is spent upon the lower muscles of the neck, which stretch out the neck and head.

5. *Muscula inferior.*

The sixth is the internall jugular, this ariseth where the cannell bone is articulate with the *sternum*. This joyned with the nerve recurrent, and the soporall artery, marcheth by the side of the wind-pipe, to the throat.

6. The internall jugular.

The seventh is the externall jugular, this marching up under the skin, and the quadrat muscle, which pulleth downe the cheekes, commeth to the eare. This in beaſts is bigger than the internall, otherwise than it is in man.

C. P. V.

Of *Vena arterialis*, and *arteria venalis*.

THE second vessel in the brest is *Vena arterialis*. It is a veine from its office: for it carrieth

*Vena arterialis.*

naturall blood to the lungs by the right side of the winde-pipe : It is called an artery, because the coat of it is double, not single as that of veines. It doth spring from the upper part of the right ventricle of the heart, and is implanted into the substance of the lungs by the right side of the winde-pipe.

*Arteria  
venalis.*

The third vessell is *arteria venalis*. It is called an artery, because it carrieth arteriall blood ; but a veine, because it hath a single coat as a veine. It ariseth from the upper part of the left ventricle of the heart, and is implanted into the substance of the lungs by the left side of the winde-pipe.

The  
valves of  
these two  
vessels.

The *Vena arterialis* hath three valves called *Sigmoides*, from the figure of the great *sigma*, which answereth the Latine S. the figure is this C. They looke from within outwards, to let out the blood; but to hinder the returne of the same.

The *Arteria venalis* hath two valves called *mitrales*, because they  
are



are like a Bishops Miter. They look frō without inward, to let in blood carried from the *vena arterialis*. They are bigger than those of *vena cava*; and have longer filaments, and to strengthen them many fleshy snippets are joyned to them.

It hath two valves only, that the fuliginous vapours might the more readily be discharged.

It hath also but a single thin coat, partly for the same purpose, partly because the blood sent from the *vena arteriosa* is cooled by the *bronchia* of the lungs, before it entereth into *arteria venalis*: it needeth not so thick a coat as an artery; and because veines only carry in blood, and arteries carry out, Therefore *arteria venalis* is placed in the left ventricle, and *vena arterialis* in the right. Both these vessels not farre from their beginning, are divided into two branches, whereof the one passeth to the right part of the lungs, and the other to the left; and each of these is subdivided into other  
H. 4. bran-

branches, untill at the last they end in small threeds.

The greater branches accompany one another, so that the veine still marcheth with the *arteria* joyned together by many inosculationes or *anastomoses*.

Betweene them the branches of *aspera arteria* march. These vessels are great, because the lungs by reason of their perpetuall motion require much nourishment.

How the  
blood is  
carried to  
the left  
ventricle  
of the  
heart.

First, the blood is carried into the lungs by *vena arterialis*, and from hence to *arteria venalis*, by sundry *anastomoses*, and from hence to the left ventricle of the heart. Where being made spirituous, it is sent by the *aorta*, to impart life to the whole body.

One thing is to bee noted, that no aire in its proper substance is carried to the heart: for the blood contained in these two vessels, is sufficiently cooled by the *bronchia* passing betweene them.

How the  
blood is  
cooled.

The blood is cooled, First, by staying in the lungs while it is in passing.

Sc

Secondly, by touching the *bronchia* cooled by the attraction of fresh aire : And thirdly, by the continuall motion of the lungs.

One thing is to be noted, That in *arteria venosa* a little below the valves there is found a little valve ever open. It being removed, there appeareth a hole, by the which the blood passeth freely from the *vena cava* to it, and returneth by reason of this *anastomosis*; that the blood in the veines may be animate.

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CAP. VI.

*Of the great artery, and first of the truncke ascending of the same.*

THE fourth vessell is the great artery called *aorta*; because it receiveth the aire. It springeth from the upper part of the left ventricle of the heart, where it is largest and hardest.

Before it come out of the *Pericardium*

*Coronarie arterie.*

*cardium*, it sendeth two small twigs, from each side one: which compasse the *basis* of the heart, like a garland, and send down according to the length of the heart other twigs: These are called *Coronariae*. These twigs are more in number, and larger about the left ventricle than the right, because it requireth greater plenty of nourishment, by reason of its stronger motion, which digesteth much blood.

The situation of the *aorta*.

Its trunks.

The branches of the trunk ascending.

It is placed between the windpipe and the *vena cava*, tied to the mouth of the stomacke, passing under the trunk of *vena arteriosa* upward: when it hath pierced the *Pericardium*, it is divided into two trunks; whereof the one is called *truncus ascendens*, the ascending trunk: The other *descendens*, the descending.

Of these two the descending is largest, because it ministereth life to more parts.

This ascending trunk before it passe to the armes, is divided into

two

two branches, whereof one passeth to the right, the other towards the left arme; they are called *subclavii rami*, because they march under the canell bones. When they are gone out of the brest, they are called *Axillares*. From both the lower and upper part of both these branches, sundry sprigs doe spring.

From the upper part proceedeth *intercostalis superior*, which bestoweth twigs upon the distances of the uppermost foure ribs. From whence others are sent to the adjacent muscles, and the *spinalis medulla*.

From the  
upper  
part.

From the lower springeth that branch, which is called *Cervicalis*, but more fitly *Vertebralis*; for it springeth behinde where the *vertebra*; from thence marching upwards it bestoweth twigs upon the *spinalis medulla*, which enter by the passages, by the which the nerves, as also upon the muscles, which are placed in the hinder part of the necke, and at the last ente-

From the  
lower  
part.

entereth into the *Cranium*, by that hole, by the which the *spinalis medulla* descendeth from the braine.

This with its fellow when it is come to the cell of the wedge-like bone on each side of it, betweene the first and second pair of sinewes, having been divided, cause *Plexus coroides*.

2 The second, the *Arteria mammaria*, which accompanying the *Vena mammaria*, is joyned with the *epigastrica arteria*, ascending by inosculation about the navell.

3 The third is that called *Muscula*, and is distributed upon the muscles of the neck.

4 The fourth is the Soporall, one on each side; so called, because if they be stopped, sleep doth immediately follow.

These soporall arteries when they are come to the throat, they are divided into two branches, to wit, the externall, which is lesser, and the internall which is larger.

The

The externall bestowed twigs upon the muscles of the face, upon the roots of all the teeth of the lower jaw, having entered into the cavity of the mandible, and going out upon the chin.

The internall branch when it hath about the throat, it hath bestowed twigs upon the tongue and larynx, about the lower part of the skull, it is divided into two branches; whereof the lesser and hindmost accompanying the branch of the internall jugular marcheth toward the hindermost part of the skull, and entering at the second hole of the nowle entereth into the hollownesse of the *dura mater*.

The formost and largest, when it hath entered into the cavity of the skul, thorow its proper hole in the parietall bone, and is come to the cell of the wedge-like bone, it maketh *rete mirabile*; which in beasts is large, but in man very obscure.

## CAP. VII.

*Of the descending trunk of  
the Aorta.*

**T**HE descending Trunk of the *aorta* about the fifth *vertebra* of the breast bending towards the left side, marcheth downwards towards the last *vertebra* of the loynes.

In this march it sendeth forth sundry branches, which are these:

1. *Intercoftall inferior arteries* in number eight.
2. *Phranica* two.
3. *Cœliaca* one.
4. *Mefenterica superior*.
5. *Emulgentes* two.
6. *Spermatica* two.
7. *Mefenterica inferior*.
8. *Lumbares*.

The branches of the trunk descending.

1. The Inferior intercoftals.

The inferior intercoftall arteries, accompanying the veines and nerves of the same denomination march according to the length of the lower part of the ribs, where there is a hollownesse to receive them, and in the true ribs end, where the cartilages begin; but in  
th



the short ribs they goe a little further, even to the sides of the lower belly.

These send sprigs by the holes of the nerves to the marrow of the backe, and to the muscles which rest upon the *vertebra* of the backe.

These not only afford spirits and blood, to the intercostall muscles; but carry also quittour and water gathered in the cavity of the brest, sent by the trunk of the *aorta* to the bladder, by the emulgent arteries, according to *Spigelius lib. 6. cap. 4.* whereas *Fallopins* will have these matters to bee sent by *vena sine pari*; but this a shorter way.

By what way quittour and water is sent from the brest to the bladder.

*Phrenica* are two, one on each side: they spring from the trunk as soone as it is come out of the cavity of the brest, and being spread into many twigs, whereof the most are bestowed upon the lower part of the midrife, where the *vertebra* of the backe are; and some also upon the upper part, which afterward

2. *Phrenicae.*

3. *Celiaca.*

ward passe to the *pericardium*, where it cleaveth to the midrife.

*Celiaca* is one, so called because it sendeth twigs to the stomacke. This springeth from the fore-part of the trunk. This bestoweth branches upon the stomacke, liver, gall, caule, the *duodenum*, the beginning of the *jejunum*, to a part of *Colon*, to the *Pancreas*, and spleene.

*Mesenterica superior* doth arise a little below the *celiaca*, accompanying the *vena mesaraica*. It bestoweth many twigs upon the hungry and *iliu*m gut; as also upon that part of *Colon*, which lieth between the hollow part of the liver, and the right kidney. So that this branch is bestowed upon the upper part of the mesentery.

5

The emulgent arteries are two, the right and the left. They spring from both the sides of the trunk under the former, where the first and second *vertebra* of the loines are coupled by a ligament. The left is lower than the right. These when

when they are come to the kidneys are divided into two branches, which are inserted into the cavities of the kidneys, and by innumerable small twigs are spent upon the substance of the kidney. The use of these, besides the common, is to discharge the serosity of the arteries, whereof they have great store.

*Spermatice*, or *seminales*, the Seminary; they are in like manner two, which spring from the forepart of the trunk.

The left artery doth not spring from the left emulgent artery as the veine doth. These marching downward, accompany the veins of their side. In men they are carried to the stones by the productions of the *peritonæum*; but in women when they are come neere to the stones, they are divided in two branches; whereof the one is bestowed upon the stones, and the other upon the bottome of the matrix, in the side of it.

*Mesenterica inferior*, it springeth about

6

7

about the *os sacrum*, from the trunk a little above, before it sendeth forth the *rami iliaci*. It is bestowed upon the left part of the *Colon*, and the *rectum*; and accompanieth the Hemorrhoidicall veines to the *anus*.

*Lumbares rami*, the. Loynes branches, in number foure: They spring from the backe part of the descending trunk of the *aorta*. These passe to the *vertebrae* of the loynes, and their marrow by their holes, as also to the adjacent muscles. Some things here offer themselves to be observed.

1. That when either the colicke is changed into the gout, or contrarywise the gout into the colick; if the last happen, then the humors are sent from the crurall arteries to the trunk, and from thence to the mesentericall branches of the arteries; and from thence to the guts. If the first happen, then the humours passe the contrary way. Read *Hip. 6. Epid. Sect. 4.*

2. If the colicke turne either

to a palsey, or falling sicknesse, as it may fall out, according to *Agenet. lib. 3. cap. 43.* then the humour doth returne from the *Colon* by the mesentericall arteries, to the trunk; and from hence to the *Lumbares*, which being filled compresse the adjacent nerves: from whence difficulty of going ensueth; which may be called an imperfect palsey. If the falling sicknesse be procured, the humour is sent to the groyne arteries, and thence to the braine.

3. Clysters may purge the whole body: for the clyster moistning the whole *Colon*, may by the twigs of the arteries draw noy-some humours from the trunk, and when purgation is caused by anointing the navill (which often falleth out in using the unction for the pox) or vomiting by ministring a clyster, wherein white Hellebore is, first the arteries draw the force of the medicaments, and this same faculty again doth purge by the arteries.

9

9. *Arteria sacra*, or those branches which goe to the *os sacrum*. They spring from the lower part of trunk, before it sendeth out the *rami iliaci*. They are somewhat large. They marching downward, and leaning upon the *os sacrum*, enter into the holes of it, and so passe to the marrow and hinder part of the same. By these the matter which causeth the collicke may passe to procure the palsey of the legs.

10

*Iliacæ arteria*, these arising below the former, about the lower *vertebra* of the loynes, mount above the veine, lest it should be hurt by the hardnesse of the *os sacrum*, in their continuall motion.

They being in number two large branches, called *Arteria iliaca*, or flank arteries, and marching downward to the thigh obliquely they represent the Greeke  $\Lambda$ . inverted. These a little below the division of the trunk are subdivided into two branches, to wit, the internal

ternall or lesser *Iliaca*, and the externall or greater.

The internall hath two branches; The one is called *Glutaa*, and with a veine of the same denomination, is bestowed upon the muscles, which make up the buttocks: The other is called *Hypogastrica*.

This is large, this being carried directly to the lower part of the *os sacrum*, in men it bestoweth twigs to the bottome and necke of the bladder, and to the straight Gut; but in women wherein it is larger, it sendeth plenty of twigs upon the bottome and neck of the matrix besides the former parts. The externall or greater hath two branches.

The first is called *Epigastrica*. It springeth from the outer part of the artery a little before it passe thorow the *Peritonaeum*; and turning upwards it mounteth upwards by the inner side of the straight muscle of the belly: and about the navill it is inosculate with

with the *arteria* descending.

The second is called *Pudenda*. This is but a small branch, and when it is come out of the *Peritonaeum*, it passeth obliquely by the joyning of the *os pubis*, and is bestowed upon the skin of the secret parts.

Anote.

One thing isto be noted, that the *Arteria umbilicalis* springeth from the internall *Iliaca*; and going alongst the great artery, is firmly tyed to the bladder by strong membranes.

When the child is in the belly, it is hollow; but without hollownesse when the infant is born.

The valves.

About the orifice of these vessels, eleven valves are to be scene, if the ventricles of the heart be dissected transverse neere to the *basis*. Of these some are called *trifurca*, and resemble a barbed arrow; some *Semilunares*, or *Sigmoides*, because they resemble a halfe moone, or the Greeke letter called *C*. Those bend inwards, because they are set before the vessels which carry in blood. These



These bend outward, because they are appointed for the vessels which carry out the blood.

The *Vena cava* hath three *Trisulca*; but the *Arteria venosa* two.

The *Aorta*, and *vena arteriosa* have three *Sigmoides*.

# CAP. VIII.

*Of the hearts similiary external parts.*

**H**itherto of the vessels of the breast: Now follow the entrals, which are the heart and lungs. The heart in Latin is called *cor*, from the Greeke word *καρδία*, from *καρτία*; so called, by reason of the sovereignty which it hath above other parts of the body; or from *καρδία*, which is derived from *καρδίακινεσις*, because it is tossed with continuall motion: of figure it is *pyramidal*. The Ancients likened it to a Pine Apple.

Its appellation.

Its figure.

As

Its bignesse.

As concerning its bignesse, it is larger in man than in beasts, if you consider the stature of his body. The externall superficies of it is smooth, but within it is unequal, and hath many fibres.

Its substance.

The substance of it is fleshy, red, and compact. It is sixe inches in length, and foure in bredth. It is tyed above to the *mediastinum*, below to the *diaphragma*, by meanes of the *pericardium*.

Its connexion.

Its parts.

The parts of it are either dissimilary, or similary.

Its dissimilary parts.

The dissimilary are two, to wit, *Basis*, or the head, which is round and broad, and *micro*, or *apex*, the small point, which doth bend towards the left side, and forwards under the left pap, where one may feele the motion of the heart.

The similary.

Externall.

I

The fat.

The similary parts are either externall, or internall. The externall are foure; to wit, the fat, the membrane which covereth it, its vessels, and the eares. The fat is more copious in man than in beast,

beasts, chiefly in the upper part, where the vessels passe out.

The membrane with the which the heart is covered, is thin, and cannot be separated from it. The veine whereby it is nourished is called *Coronaria*; because in figure it is like to the Crownes of the ancient Kings; for it compasseth the basis of the heart round about, and from thence sendeth branches to the whole substance of it, even to the point of it. In the right side they are fewer and lesser; but in the left, thicker and larger. This veine springeth from the ascending trunk of *vena cava*, a little before it entereth into the right ventricle.

*Arteria Coronaria* compasseth the basis of the heart, as the veine doth, and sendeth sprigs to the whole heart, but chiefly to the left side. It springeth from the beginning of the *aorta*, before it passe thorow the *pericardium*.

It hath nerves from the 6<sup>th</sup> conjugatio, but smal; bestowed upon the  
I basis

The membrane.  
The vein.

The arterie.

Nerves.

The  
eares,

basis nere the *vena arteriosa*.

The last externall parts are the eares, both because they are like to the eares of a Dog, and are fastned to each side of the heart, as eares are to the head. Their substance is nervous: they have three sorts of fibres, & are not much thicker than the skin. In figure they are pyramidall, somewhat sharpe at the top: they are unequall both without, and within; yet they being full of blood, the externall superficies seemeth smooth. In number they are two; the right which is seated before the orifice of the *vena cava*, and the left seated before the *arteria venalis*. They differ; for first, the right is largest; secondly, the left is harder, more fleshy, and thicker: thirdly, the left is more pointed, and broad. Their motion is contrary to that of the heart; for when the heart is dilated, they are contracted to expell, and contrariwise. The blood is first of all received and stayed in these eares, and for two reasons

reasons. First, that the whole heart should not bee too much stretched by the influx of blood, and so the dilatation and contraction of it hindered; as we see in a bladder too much filled with water. Secondly, that the vessels should not burst; and so when the heart is dilated, they are contracted; and softly power in the blood. They are two, because there bee two vessels which carry in blood to the heart, to wit, *vena cava*, and *arteria venosa*; and because the *cava* is larger than the *arteria venosa*.

The substance of the eares is nervous, because they were to admit dilatation and contraction. The veine hath a semilunary valve to hinder the reflux of the blood, when the heart is contracted. The fat about the heart moistneth it; and yet is not melted by the heat thereof, because it is suet, and not grease.

## CAP. IX.

## Of the similar internall parts.

Of the  
ventricles.

How the  
ventricles  
differ.

THE internall parts of the heart are the two ventricles, the right and the left, and the *Septum*.

The ventricles doe differ in these points. 1. In bignesse; so the right is much bigger than the left; for it reacheth from the *basis* to the *micro*. 2. In the blood contained; for the blood in the right ventricle is venall, but in the left arteriall. 3. In figure; for the right is semicircular, but the left orbicular. 4. The left ventricle is placed exactly in the middle of the heart: for the right seemes only to be an appendix set only to the side. 5. The left ventricle is of a more solid and compact substance, and is three times thicker than the right. 6. The right ventricle was appointed by nature to minister nourishment to the lungs; but the left

left to bee a store-house of vitall blood, whereby it is communicate to the whole body. If you dissect the heart according to the longitude from the *basis* to the point, you shall finde the internall superficies very unequall, full as it were, of pits; yet the left ventricle is most unequall. In both these ventricles you may note some fleshy fibres springing from the *mura* of the ventricles, which becoming membranous fibres are inserted into the lower parts of the valves. There are five in the right, but in the left two only, yet more thicke and solid.

The action of the heart is called *pulsation*. The cause of this is a peculiar faculty granted to the heart, flowing from the forme of it. The pulsation hath two motions, dilatation and constriction.

In dilatation the *macro* is drawn to the *basis*; for so it becometh sphericall and more capable. In this motion it draweth blood to it selfe from the trunk of the

The action  
of the  
heart.

Dilatation.

Constric-  
tion.

*VENA CAVA.* This motion is performed when the straight fibres are contracted, and the transverse relaxed.

In constriction the *myera* doth fall from the *basis*, and so the heart becommeth narrower. By this motion the vitall blood is expelled out of the heart. This motion is performed by the constriction of the transverse fibres. Betwene these contrary motions wee must imagine some rest.

The Sep-  
tum.

These ventricles are divided by the *septum*, which is nothing else but the right wall of the left ventricle; wherefore the right side is bunched, but the left hollow. It is unequal as the ventricles. The pits are not perinable, and so no blood can passe through the *septum*, from the right to the left ventricle.

CHAP.



CAP. X.

Of the frame of the  
Lungs.

THE second entrall of the  
breſt, to wit, the Lungs fol-  
low, called in Latine *Pulmo*, and  
in Greeke *πνεύμων*; becauſe they  
are the inſtrument of breathing:  
we are to conſider their frame and  
action.

As concerning their frame, theſe  
things are to bee marked. 1. The  
ſubſtance. In a man it is of the co-  
lour of a Roſe, ſpongiouſ and  
light, ſo that it ſwimmeth in water:  
But in a childe in the wombe it is  
redder, harder, and heavier, and  
doth ſink in water; becauſe it is fed  
with venall blood, derived from  
the *vena cava* to *arteria venoſa*, by  
*anastoſiſ*.

Its ſub-  
ſtance.

2. The Lobes, They are ordina-  
rily two, ſometimes three. If there  
betwo, the upper is ſhorter than  
the lower. They cleave together

Its Lobes.

by membranous tyes : they are like to the Horne of an Oxe ; for towards the brest they are bunched, but towards the backe hollow.

Its membrane,

The lungs are covered with a membrane. It is framed of the common coat of the vessels, which are bestowed upon the lungs. It is thin, soft, and very porous, to give way to noysome matters, which sometimes are carried to the *aspera arteria*, to be voided by spitting.

Its vessels,

As for its vessels ; veines it hath from the *vena arterialis*, which passeth out of the right ventricle of the heart. Arteries it hath from the *arteria venosa*. The first bestow nourishment, the second, life. As soone as they touch the lungs, they are divided in two branches, and those into more, untill at last they end into thred-like twists. It is fed neither by the *vena cava*, nor *porta* ; because the blood continued in these is too grosse ; for they require for nourishment a blood, betwene venall

and

and arteriall; which is not seen<sup>e</sup> in any other part of the body. The blood is carried from the right ventricle of the heart, from the *vena arterialis* to the *arteria venalis*. And so the hot blood of the left ventricle is cooled; as the meane boyling of a pot is stayed by powring in some cold water. It hath a small nerve from the sixth conjugation, which goeth no further then the membrane, which affordeth but a dull feeling.

4. The winde-pipe is remarkable in Latine *aspera arteria*. It is called an artery, because it receiveth in the aire by inspiration: *aspera*, because its substance is unequall.

It may be thus described: It is a long pipe framed of round cartilages, tyed together by membranes, ever open, which beginning at the lower part of the throat, and resting upon the mouth of the stomacke, is implanted into the lungs by many branches. It hath two parts; the upper,

The cooling of the blood of the heart.

The winde-pipe. Its denomination.

Its description.

Its parts.

The *rima*.

which is called *larynx*; and the lower, which is called *branchus*. In the upper part there is a chinke that the aire passing through a narrow passage might cause a sound. The instruments of the voice are moyfined by the glandules, to cause the cleerer sound.

Its frame.

The winde-pipe is not altogether cartilaginous; for so it could not have beene dilated, nor altogether membranous, for then it would have shrunk together; whereof the cartilages are tyed together by membranes. These cartilages are like to the Greeke C. The winde-pipe then beginning under the annular cartilage of the *larynx*, it passeth downward straight waies, becomming by degrees smaller; it cleaveth by a membrane to the mouth of the stomacke: and about the fourth *vertebra* of the brest, it is divided into two branches, the right and the left, which enter into those sides of the lunges; and so the branches encrease and grow lesser, untill at the

the last they end by small twigs, about the superficies of the lungen. They are called *bronchia*. These are framed of a whole circle, being round. These are placed between the branches of *vena arterialis* and *arteria venalis* to coole, the blood; The artery being in the fore part, the veine in the hinder.

*Bronchia.*

It hath veines from that branch of the externall jugular, which passeth to the mouth. Arteries it hath from the great and deepe branch of the soporall which passeth to the throat. Nerves it hath from the sixth conjugation, called *recurrentes*; because having marched downeward, they turne up againe to the muscles of the *larynx*. Two paire of glandules are placed at the sides of the *larynx*; the first paire is seated at the sides of the *uvula*, about the root of the tongue. They are covered with the common membrane of the mouth; they receive the superfluous humidity of the braine and turne it to spittle. They are called *tonsilla*,

Its vessels.

Glandules.

*tonsilla*, and by Chirurgions *amygdala*.

The second paire in the lower part of the *larynx* rest upon the buckler-like cartilage. These in women, by reason of their moist temperature swelling, cause their neckes to bee round, whereas in men, chiefly of a dry complexion, they becomming lanke discover the protuberance of the fore-part of the *larynx*, which is called *promum Adami*.

Its membranes.

It hath two membranes; one externall and thin from the *pleura* cleaving fast to the eyes of the cartilages.

The other internall from that which covereth the roose of the mouth, of a thicker substance having straight fibres, and bedewed with an unctuos humour to withstand sharpe rheumes, of an exquisite sense; so that if but a crum chance to fall into it, it will be like to strangle one.

## CAP. XI.

*Of the action of the lungs.*

**T**HE action of the lungs is called *respiratio*, or breathing: this is nothing else, but the taking in and letting out of the aire by the winde-pipe, that the heart the wel-spring of the vitall heat may be coo'ed.

Breathing is performed by two actions; to wit, inspiration and expiration. Inspiration is performed when the lungs are dilated, for then the aire is drawne in; but expiration happeneth when the lungs are contracted, for then the aire is expelled.

The blowing of a paire of bellows doth expresse these actions. Dilatation is caused by the elevation of the brest, but contraction by falling downe of the brest. The brest is dilated by the eleven externall intercostall muscles, all which performe the office of one muscle.

The parts  
of breathing.

muscle. These arise from the upper rib, and end by an oblique passage in the lower rib. The brest is contracted by the eleven internal intercostall muscles; contrary to the former in their beginning, insertion, and office: they crosse one another in forme of Saint *Andrewes* Crosse; so that the motion of the lunges doth proceed from the motion of the brest. The connexion of the lunges doth make this manifest; for above they are fastned to the necke and backe by the winde-pipe, in the fore part to the *sternum*, behinde to the *vertebra*, by the *mediastinum*; below to the midriffe by some fibres which spring from the upper membrane of the *pleura*.

## C A P. X I I.

### *Of the Neck.*

**T**His part is called *Collum*, not a *colendo*, because it used to bee adorned with chaines; but



but because it riseth from the shoulders *instar collis*, like a hill. It comprehendeth the distance betweene the head and brest. It was framed for the winde-pipe and mouth of the stomack.

The parts of it are either containing or contained. The containing are the same which are found in the rest of the body, saving that the *membrana carnea* seemeth to be fleshy.

The parts contained are these:  
1. The *larynx* which is the upper part of the winde-pipe. When the gullet bendeth downeward in swallowing, this starteth upward to give way to swallowing.

It is framed of five cartilages:  
1. Is *Scutiformis*, or buckler-like; for within it is hollow, but without embossed; that part which sticketh out is called *pomum Adami*, and is greater in men than in women. 2. Is *Annularis*, because it is like a Turkish ring, and compasseth the whole *larynx*; in the hinder part it is broad and thicke.  
3. and

Its denomination.

Its parts.  
Containing.

Contained.

The cartilages of  
of the *larynx*.

Glottis.

Epiglottis.

Pharynx.

3. And 4. Is *Guttalis*, because it resembleth the necke of an ewar: this is double. They have upper and lower proecesses; the upper are soft, flaggy, bending outwards, being joyned together they are like the necke of an ewar: They make up the *Glottis*. 5. Is in the upper parr, and within the *Scutiformis*. It is soft, and called *Epiglottis*, because it is placed above the *glottis* or chink, and covereth it. It is of the forme of a tongue. It is appointed to hinder the falling down of any thing which may prove offensive unto the winde-pipe when wee eat or drinke. It is pressed downe by the weight of the things which are taken by the mouth, and turneth them downe to the *gula*. Being suspended by a ligament, being pressed downe it riseth up immediatly. 2. Part contained is the mouth of the stomacke. It is called *Pharynx* from *φαρυγ*, because it conveyeth the meat and drinke to the stomacke. It is fleshy. The attraction of it is performed

formed by the straight; but the  
expulsion by the orbicular fibres.

3. Is the *woula* : It is a red, fleshy  
and fungous substance. It is cover-  
ed with the red application of the  
skin of the roose of the mouth.

4. The soporall arteries. 5. The  
internall jugulars. 6. The recur-  
rent nerves betweene these : of all  
these parts the *larynx* is framed for  
the voice. The remote instruments  
of the voice are the brest and  
lunges. The neerer, either prepare  
as the winde-pipe, or helpe as the  
finewes and muscles, or keepe it  
as the throat or mouth, or imme-  
diately forme the voice, and that  
is done by the *glottis* ; for the aire  
being forcibly blowne out by the  
lunges, it beating upon the chinke  
shut reasonably, procureth the voice

The living creatures which  
make no voice have no necke, as  
fishes. The *woula* causeth the plea-  
sant sound of the voice : besides it  
hath these uses : 1. It stayeth the  
aire a little, that it passe not cold &  
impetuously to the lunges. 2. Like a  
fanne

*woula.*

The soporall arte-  
ries.

The in-  
ternall ju-  
gulars.

The re-  
current  
nerves.

The in-  
struments  
of the  
voyce.

What li-  
ving crea-  
tures have  
no voice.

fanne it putteth backe dust, and  
such like bodies. 3. It hindereth  
the going up of liquid things to  
the nose. If it bee deficient, the  
voice becommeth unpleasant; and  
the lunges are cooled and made  
apt to receive defluitions, by the  
which they are ulcerate, and so  
*rabes* procured.

THE



THE THIRD  
B O O K E;  
OF THE  
H E A D.

C A P. I.

*Of the common parts containing.*

**N**ow followeth the third great venter of the body, called *Caput*, the head; because the senses and nerves take their beginning from thence.

It is placed in the highest region most fit for the senses, but chiefly for the eyes; for they ought

Its denomination.

Its seat.

to bee placed there as in a watch tower ; and they having but few sinewes, which could not endure a long passage, it was requisite that the braine should be at hand.

Its figure

Of figure it is sphericall ; yet somewhat flattish and long.

The parts  
of it.

The parts are of three sorts, for they are distinctive or expressive of the regions, or constitutive of the whole.

The parts distinctive are two, the hairy scalpe called *calva*, and that without haire called *facies*. The parts which expresse the regions, are foure : 1. *Sinciput* or the fore-part reaching from the forehead to the coronall suture. 2. *Occiput*, the noddle, or the hinder part beginning at the suture *lambdoides*, and reaching to the first *vertebra* of the necke. 3. And 4. are called *tempora*, or the temples. The laterall parts betweene the eares and eyes.

The parts constitutive are either containing or contained. The containing are either common or proper

proper

proper. The common are *cuticula*,  
*cutis*, and *membrana carnosā* : the  
*cuticula* is thinner and softer ; but  
the skin thicker than in any other  
part of the body, yet *porous* to give  
way to the nourishment of the  
haire. The *membrana carnosā* in  
some it so cleaveth to the whole  
skin, that they can move al the skin  
at their pleasure: fat was not requi-  
site, lest it should have hindered  
the discharging of the fuliginous  
vapours, and caused the head to be  
too big.

C A P. II.

Of the haire.

SEing the skin is garnished  
with haire, I will discourse  
briefly of it. A haire is a body,  
cold and dry, small, thred-like,  
hard and flexible budding from  
the skin. The haire is not round,  
but foure square, as the stalkes of  
some plants. This may bee discern-  
ned

Its deno-  
mination.

Its figure.

ned if a haire bee put into the opticke instrument called, *Jack in a Box*.

The parts  
of it.

A haire hath three parts, one outward which will admit cleaving: The middlemost flexible, and lowermost, which is called the root. It is white, and beset with a mucous substance, by the which it cleaveth to the skin.

The matter.

Haires are produced, not of the fuliginous excrements of the braine, but of blood drawne by the rootes, and bestowed upon the trunks; As the feathers in fowles are produced; for if you plucke out any from very young ones you shall manifestly see, that blood doth both produce and feed the haire.

Their  
substance.

The substance of the haire is compact, solid, and hard, apt to be cleft, according to the length, and laterally flexible.

Their colour.

The colour of them is answerable to the naturall constitution of the party. They are most commonly straight in those which are born



borne in cold countreyes, but curled in those who inhabit hot climates.

They are short and thin in infants, longer and harder in men, but longest in women.

The haire have foure uses; for they serve for defense and beauty, and serve for the expulsion of fuliginous vapors, and shew the temperature of the whole body and skin.

Their bigness.

### C A P. III.

*Of the proper containing parts.*

THE proper containing parts are foure; to wit, the muscles, the *pericranium*, the *cranium*, and the *Meninges*: Looke for the muscles in the treatise of the muscles, and for the *cranium* in the doctrine of bones.

The *pericranium* is a membrane thinnish and white, immediately seated under the *membrana carnosæ*.

The *pericranium*.

No *Perio-*  
*stium.*

Its con-  
nexion.

The me-  
ninges.

It covereth the whole skull, except wherethe temporall muscle lyeth upon the *cranium*. It being stretched over the temporall muscle doth firmly binde it. And seeing it is most tender, it causeth horrible paine and inflammation, when the temporall muscle is wounded. There is no *Periostrum* besides it, yet it is double; and being of a competent thicknesse, it may be divided, as all membranes of the like nature.

It is tyed to the *dura mater* by some nervous fibres, which passe within the skull, to stay firmly the *dura mater*, and so the braine from inordinate moving. And although in infants new borne these be strongly united; yet in proceesse of time they part, and become joyned only by some fibrous ties; from it to the braine by these inflammation may bee communicated.

The Meninges follow, called by the *Arabians*, *matres*; as if all the membranes of the body were propagat

propagate from them: they are two in number, the *dura* and *pia mater*. The *dura mater* having in the upper superficies of it many veines, it representeth the leafe of a Fig-tree. It is a little distant from the skull, to give way to the motion of it. It hath two membranes; the upper towards the *cranium* is harder, rougher, and lesse sensible; because it was to touch the hard skull.

*Dura mater.*

The lower is smooth, slippery, and, as it were, bedewed with water: It hath its beginning from the *basis* of the skull, unto the which it cleaveth firmly. It hath connexion with the skull and *dura mater*, by nervous fibres. It hath a threefold use. 1. It wrappeth in the braine, and the sinewes proceeding from it, and is a defense unto them 2. It divideth the brain from *cerebellum*. 3. It divideth the braine it selfe in two parts, the right and left. This division, by reason of the figure of it, being broader in the hinder part; and by

*Pia mater.*

K degrees

degrees growing narrower is called *falx*, or the *sicle*.

*Pia mater.*

*Tenuis* or thin *meninx*, or *pia mater*. It immediatly covereth not only the outmost parts of the brain, but the inner cavityes in like manner. It receiveth from the *crassa meninx* innumerable branches of vessels, and bestoweth them upon the braine.

It hath two uses; First, it keepeth the soft substance of the braine from running abroad. Secondly, it cloatheth the *cerebrum*, *cerebellum*, and the sinewes. It is of an exquisite sense to observe such things as might hurt the braine.

#### C A P. IV.

*Of the nature of the  
Braine.*

The colour of the  
braine.

THE *Pia mater* being taken away, the braine offereth it selfe: Which in colour is white, that the animall spirits might be cleere;

cleere ; which otherwise in a darke place of another colour would become lesse cleere and troubled.

The substance is thicke, viscous, soft, and white. It is not a glandule, for it is the seat of the animal spirits ; but glandules are appointed to receive excrementitious humours, and is more curiously framed than any glandule : neither is it of a marrowy substance ; for marrow swimmeth in water, but this sinketh. Besides, the marrow nourisheth the bones ; but the braine nourisheth no part. The substance of it differeth from all other parts of the body ; as the stopes doe.

Its substance.

The substance of it doubtlesse, is a *parenchyma*, a substance oft used about the beginning of the nerves ; as that of the heart and liver are.

A man of all other living creatures hath the biggest braine ; for it weigheth foure or five lib. in some, and is as big againe as an Oxes braine : for by reason of the

Its bignesse.

The figure  
of the ou-  
termost  
circumfe-  
rence,

multitude of the animall functions, plenty of spirits is required, which cannot be procured, but by great store of blood, which cannot be contained within a narrow place.

The outer circumference is full of windings, as the guts are; that the vessels being in these, as furrowes, might safely be carried throughout the substance of the braine to nourish it.

## CAP. V.

### *Of the upper region of the Braine.*

THE braine hath three parts, *cerebrum*, that which properly is called the braine: the *cerebellum*, the little braine: and that part of the beginning of the *spinalis medulla*, which is within the skull.

Its diffe-  
rence  
from *cere-  
bellum*.

The braine differeth from the *cerebellum*, first, in substance; for  
it

it is softer ; secondly , in colour , for it is whiter ; thirdly , in bignesse , for it is three times as big ; fourthly , in cavities , because it hath many .

The braine hath three regions ; the upper , which is varicous ; the lowermost which is called *basis* ; and the middlemost . The upper part is divided in two parts , by the sicle-like processe ; to wit , the right and left . In it there is a two-fold substance ; for the upper part of it is softer , and of an ash-colour .

If you take away the three inches broad of this substance , then the *corpus callosum* will appeare ; which is nothing else but the whitest and most solid substance of the braine .

*Corpus callosum.*

About the bottome of this division of the braine , there appeareth a white substance , if you bring the sides gently together with your finger ; which is called *septum lucidum* . It is loose and wrinckled ; but if it bee spread abroad , it

*Septum lucidum.*

Fornix.

appeareth cleere. It cleaveth above to the *corpus callosum*, but below to the *fornix*. Some will have it to be a reduplication of the *pia mater*; others a portion of the braine. Under the *corpus callosum* the *fornix*, or vault is seated, of the like substance. In the upper part it is arched; but in the lower part *convex*. In figure it is triangular. It holdeth up the weight of this upper region from bearing downe the subjacent parts.

## CAP. VI.

*Of the middle region of the  
braine.*

Their  
number.  
The ante-  
rior.

Under the *testudo*, first, the ventricles are seated, called *sinus*. They are accompted foure in number, whereof two are anterior; to wit, the right and left; they are severed by *septum lucidum*. In the inner part they are covered with a membrane of an exquisite feeling.



feeling, having its beginning from the *infundibulum* ascending. Betweene these *sinus* and the *fornix* there are two textures of vessels, one on each side, framed of the complication of small veines, tyed together by a thin membrane. They are called *plexus chorioformes*: Because they are like to the membrane wherewith the childe in the wombe is wrapped, called *Ghorion*.

*Plexus chorioides.*

The third ventricle is nothing else, but the meeting of the former two, towards the hinder part. In it there are two passages: the first in the fore-part, which marcheth straight-waies down to the *infundibulum*. The second passeth under the *testes* and *nates* to the fourth ventricle. About this there is a chinke called *vulva*.

The posterior.

The *infundibulum*, or funnell, is a certaine cavity under the third ventricle framed of the *pia mater*, which becomming narrower representeth a funnill. It endeth in the *glandula pituitaria*, which re-

*Infundibulum.*

*Glandula pituitaria.*

ceiveth the fleume falling from the ventricles of the braine. It is placed in the foure-square hollownesse of the wedge-like bone.

About this glandule, about the sides of the aforesaid cavity there is a membranous twisting framed of innumerable twigs of arteries; which spring from the largest branch of the soporall artery, which passeth by a proper hole in the bones of the temples into the capacity of the *cranium*: It is called *rete mirabile*, representing a net spread abroad.

*Rete mirabile.*

Here, of the pleasant breathing of the blood, naturall sleepe is caused; but if the arteries be too full, a deepe sleepe is caused. If you blow up the soporall artery in the neck, they will be blown up also. Then the *infundibulum*, *glandula pituitaria*, and *rete mirabile* are seated in the lowest region, or basis of the braine.

4. Ventricle.

The fourth ventricle is placed betweene the lower part of the *cerebellum* and the beginning of the

the *spinalis medulla* ; and because it being round endeth in a narrow point , it is called *calamus scriptorius*.

*Calamus  
scriptorius.*

The chinke is caused of the division of the roote of the *spinalis medulla*.

About the hindermost hole of the third ventricle, which passeth to the fourth ventricle ; certaine round bodies appeare , small portions of the braine, having their denominations from those things which they resemble. The first is *glandula pinealis*, or *penis* ; because it representeth the Pine-Nut, or a Pricke. It is seated in the beginning of that pipe by the which the third and fourth ventricle are united. Nere to this on both the sides of the third ventricle foure round bodies appeare. The two upper are lesser, and are called *testes* : the two greater bearings out are called *nates*. The chinke betweene the *nates* is called *anus*. The use of these ventricles is to carry safely the venall blood ; for it

*Penis.*

*Testes.  
Nates.  
anus.*

The use of  
the ven-  
tricles,

was not safe for the veines to bee carried through the soft substance of the braine; lest the veines being compressed by the weight of it, the passage of the blood should have beene hindered.

Nature hath placed the ventricles aloft; because the blood being heavy is apt to passe downe of it selfe. From the third ventricle innumerable veines passe by the windings of the braine, to the inner substance of it. In these ventricles only the venall blood is contained, carried thither by the internall jugulars, which end at the beginning of the laterall ventricles.

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## CAP. VII.

### *Of the Cerebellum.*

Its seat.

THE second part of the braine is called *Cerebellum*, or the little braine. It is seated in the hinder part of the head or skull, unto

unto the which it cleaveth by the two membranes wherewith it is wrapped. It differeth from the braine in sundry points. First, in substance; for it is harder. Secondly, in bignesse; for it is scarce so big as the third part of the braine. Thirdly, in figure; for it is more flat than round. Fourthly, in cavities; for within it is not hollow. Fifthly, in colour, for it tendeth to a yellowish gray colour.

How it  
differeth  
from the  
braine.

It is framed of foure parts, whereof two are laterall, the right and the left: these are spericall: two are in the middle; to wit, the foremost and hindermost. These are round.

Its frame.

*Processus  
vermiformes.*

They are framed of sundry orbicular portions; and because they are like unto the wormes, which are in hollow timber, they are called *processus vermiformes*, worm-like *processus*.

The one is in the fore-part of the fourth ventricle; the other in the hinder part.

Their

Their use.

Their use is to hinder the beginning of the cavity of the *spinalis medulla*, by the *cerebellum*.

## CAP. VIII.

Of the *Spinalis medulla*.

Its name.

**N**OW followeth the third part of the braine, called *spinalis*, or *dorsalis medulla*.

Its substance.

The substance of it is not double, as it is in the Braine, but uniforme, white, and compact; as it groweth in length it becometh more and more hard.

Its parts.

It hath two parts; *viz.* that which is contained within the braine, and that which is kept within the *vertebra* of the backbone. That which is within the skull is about foure inches in length. That which is without, and beginneth at the great hole, reacheth to the *Coccyx*, growing smaller and smaller, untill at last it end in many small twists, which resemble

resemble a horse taile.

It hath three membranes. The first is that which immediatly toucheth it. This springeth from the *dura mater*, and passeth betweene both the parts of it. The vessels which afford nourishment and life, passe alongst this membrane. The second covereth this, and springeth from the *dura mater*. There is no distance betweene, as is seene in the braine, but one toucheth another. The third proceeding from the ligament which joyneth together the *vertebra*, covereth both these.

Its membranes.

It is divided all along, as it were by a long section untill you come to the *vertebra* of the loines: you may separate these parts by boyling, for then they will fall asunder. This division is the cause that sometimes one side only is paralytick. The *spinalis medulla* in figure is round.

Its division.

Its figure.

It springeth both from the *cerebrum* and *cerebellum*. Two rootes it hath from the fore-part of the braine,

Its beginning.

braine, about the middle of the ventricles : these are in the fore-part, and bigger, and are called *nates*. It hath two in like manner which are lesser, and are called *testes*. They spring from the lower part of the *cerebellum*. These marching towards the backe-part, meet together, and make the *spinalis medulla*.

The hinder trunkes are clipped with a procelse; which by *Rawlin* is called *pons cerebelli*.

The common error concerning the ventricles of the braine.

The cavity betweene the *cerebellum*, and the *spinalis medulla* is accompted the fourth ventricle, as the vacuity betweene the *nates* and *testes* the third, but erroneously ; for they are not within the substance of any part of the braine; but are of a necessity caused by reason of the parts aforementioned: So that in truth there are but two ventricles, or rather one parted by the *septum lucidum* ; yet for doctrines sake foure ventricles are set downe.



## CAP. IX.

*Of the action of the Braine.*

THE action of the braine is this: After that the spirits and blood are discharged into the *Sinus* of the *dura mater*, by the veines and arteries to temper the heat of them, the braine is ordained (seeing it is colder than the heart) that the animall functions, which are feeling and moving, may be the more readily executed. Wherefore the animall spirits seem not to differ from the vitall spirits in substance, but in qualities; to wit, the temperament and attenuation; for they must be more temperate, because heat doth both taint the reason (as we may see in drunkenness and raving) and hindereth or perverteth the motion.

The spirits ought also to be more subtile; because they are to passe, like a thunder, through the bodies of

Whether the animal spirits differ in substance from the vitall. Why they ought to be temperate.

And subtil.

The place  
of the  
reasona-  
ble soule.

of the nerves. So, as the vitall spirits are carried to the parts of the body by the arteries, so the animall are carried by the nerves.

The animall spirits for this cause also ought to be subtile, because the reasonable soule is resident in the braine, which doth contemplate things immateriall, as Angels and it selfe.

### C A P. X.

*Of the sinewes proceeding from the  
braine, and first of the  
first paire.*

Eight pair  
of sinewes  
proceed  
from the  
braine.

SO much then of the substance of the braine. I followeth then that we shew the sinewes which proceed from it; of them there are eight paire comprehended in these verses:

*Optica prima; oculos movet altera;  
tertia gustat:*

*Quarta, & quinta audit; vaga sexta;  
at septima lingua est;*

*Octava olfactum regit, aëre naribus  
hæsto.*

The

The first paire, the *optici* or *visfori* *nervi* make; these bestow upon the eyes the faculty of seeing. They spring from the beginning of the trunks of the *spinalis medulla* in the nowle. They march on from thence drawing neerer one to another, untill they meet at the cell of *Os sphenoides*; where they are united, not by simple touching, or interfection, but by confusion of their inner, soft substance. These of all the rest are biggest and thickest, but softest. In their beginnings they are softest, but become harder, that they may passe the more securely so long a way.

These are hollow untill they be united, then the hollownesse cannot be discerned. This hollownesse may bee shewed in a large beast newly killed, and in a cleare light. After their union they are separate, and each of them, passing through the first hole of *os canini-forme*, obliquely are inserted into the center of the eye.

These

The first  
paire.

The hollownesse  
of the optick nerves

Their interfection.

Their mem-  
branes  
and mar-  
rowy sub-  
stance.

The use  
of these  
nerves.

These nerves have two membranes, and the inner soft marrowy substance. The membranes spring from meninges. The inner substance from the body of the braine.

These nerves cannot be divided into many twists, as other nerves are, but frame the tunicles of the eye; for the *cornea* doth proceed from the thicke membrane, the *uvea* from the thin membrane, and the *retina* from the marrowy substance.

## C A P. XI.

### *Of the second and third Pair.*

The second pair.

Its beginning.

Why both the eyes are directed to the same object.

THE second paire is termed *motorium oculorum*, because it moveth some muscles of the eyes. It hath its beginning about the innermost part of the beginning of the *spinalis medulla*.

These sinewes are so united where they spring out, that they make

make a common corner, which is the cause that both the eyes turne to the same parts.

It is smaller and harder than the former, and commeth out of the skull by the second hole of *os cuneiforme*, which is long; and so entereth into the orbicke of the eye.

It hath sundry sprigs: the first mounting above the opticke, it is bestowed upon the attollent muscle, and the eye-lid. The second easie to be seene, is bestowed upon the adducent muscle, by sundry small twigs. The third by many fibres is inserted into the depri-ment muscle. The fourth is inserted into the lesser oblique muscle, about the outer corner. So that this paire only moveth foure muscles.

The third paire proceedeth from the lower part of the roote of the *spinalis medulla*, in the beginning, being very small; from thence it marcheth directly forward under the basis of the braine, accom-panying

Its substance.

Its sprigs.

The third paire.  
Its beginning, marching, and insertion.

Its branches.

The cause of sneezing.

panying the second paire, with the which it passeth through the second hole of the wedge-like bone and entereth into the orbit of the eye. Then it is divided into four branches: The first bestoweth a branch upon the greater oblique muscle, which hath the *trochlea*: Then passing through the hole of *os frontis* above the orbit, it is bestowed upon the muscle of the eye-brow and the skin. The second marcheth downewards, and passing through the hole of the upper jaw-bone, which is under the orbit, is bestowed upon the muscles opening the upper lip and nose-thirles, as also the gums of the incisorie teeth of the lower gum. The third passing by the hole of the second bone of the upper jaw, which is under the caruncle of the great corner, is bestowed upon the inner membrane of the nose. This being very sensible causeth sneezing if any sharpe thing toucheth it. The fourth commeth out of the fourth hole of *os sphenoidale*

wordes, which is the chinke neere to the outward corner of the eye, and goeth to the inward part of the temporall muscle. This bestoweth the faculty of moving to the forenamed muscles.

C A P. XII.

*Of the fourth and fifth paire.*

THE fourth paire springing neere the place of the former, passeth through the sixth hole of the wedge-like bone; and passing downeward, it is divided into three branches; the first being twisted, it is united with two twigs of *nervus auditorius*, and is bestowed upon the muscles of the cheekes and lower jaw. The second is inserted into the gums of the grinders of the upper jaw. The third entereth into the hollownesse of the lower jaw, and bestoweth a twig to the roots of all the teeth. It endeth in the skin of the

The fourth  
paire.

Its branches.

Its ending

the lower lip, and the membrane of the tongue neere the root. Ordinary Anatomists make but one paire of these two last, and set it downe their third; but these two are united neither in their beginning nor insertion.

The fifth  
paire.  
Its begin-  
ning.

The fifth paire proceedeth from that place where a portion of *cerbellum* is united to the braine, lengthned by two nerves; where of the one is softer, the other harder. These passe out of the membrane together; and by the hole of *os petrosum* enter into the wreathed hollownesse of the eare.

Its twigs.  
Why they  
that are  
borne  
deafe  
prove  
dumb.

The harder sendeth twigs to the throat, nose-thirles, and a twig to the tongue. By reason of this twig, they that are borne deafe prove also dumb.

The softer nerve when it is come to the first cavity of the eare it covereth it like a membrane; and truly may be called *nervus auditorius*, seeing it doth afford the spirits to the hearing.



CAP. XIII.

Of three other paires.

THE sixth paire is called *vagus*, because it bestoweth branches upon sundry parts; and amongst the rest, to all parts of the belly which require feeling; for these being soft parts did not require hard sinewes from the *spinalis medulla*.

This ariseth from the hinder and lower part of that place, from whence the former sprung, by many small twigs. These make up two distinct nerves, which are covered with one membrane borrowed from the *dura mater*. So joyned, they passe through the second and third hole of the nowle, by the which the lesser branch of the soporall artery, and the greater of the jugular enter into the skull.

The lesser of these branches is seated more forward, and when it is come

The sixth  
paire.  
Its inserti-  
on.

Its begin-  
ning.

Its bran-  
ches.

come out of the skull it is spent upon the muscles of the throat and tongue, and the parts contained within the mouth. The greater is seated more backwards. This before it enter into the brest; above the throat, it is divided into two branches; to wit, the Exterior, which is lesser, and the Interior, which is greater.

Their  
current  
nerves.

From the Exterior those nerves doe spring, which are called *recurrentes*, or *reversivi*, because they descend and ascend againe; and *vocales*, because they being cut, hinder the voice.

Of these the right is winded about the axillar artery, as about a pulley. The left is wound about the *aorta* descending; Afterwards mounting up, they are inserted into the beginning of the muscles of the larynx, which are in the lower part. This Exterior is bestowed upon the parts of the middle cavity. The Interior branch is bestowed upon the parts of the abdomen. The right sprig serving for

for these in the right side, and the left serving those in the left.

The seventh paire, which affordeth moving and feeling to the tongue, is hardest of all.

It hath its beginning where the *cerebellum* endeth, and *spinalis medulla* beginneth.

In its beginning it hath divers sprigs, which afterward are united and passe through the fourth and fifth holes of the nowle; which are placed between the great hole, by the which the *spinalis medulla* passeth; and that out of which the sixth paire issueth. As soone as it is come out, it is united to the sixth paire by a membrane. When it is come to the root of the tongue, it bestoweth most branches upon the muscles of the tongue, but fewest upon those of the *larynx*.

The eighth paire may be called *Olfactorium*, because it serverth for smelling. They arise at the hinder sides of the braine, which are above the holes of hearing. They are sharpe in their beginning, and

L                      sepa-

These-  
venth pair

Its begin-  
ning.

Its frame.

The eigh-  
th paire.

separate : They end in the *processus mammillares*, or *papillares*. In number they are two, white, soft, broad, long. In man they are but small ; but in beasts of exquisite smelling (as Hounds) large.

## CAP. XIV.

*Of the nerves of the spinalis medulla; and first of the nerves of the Necke.*

What it is

**O**Ut of the *spinalis medulla*, which is nothing else, but the production of the *cerebrum* and *cerebellum*, by the *vertebrae* of the backe doe spring all the sinewes which move all the other parts of the body.

Its membranes,

The nerves which spring from it.

The *spinalis medulla* hath three membranes, two as the braine, one harder, the other softer, and the third membranous and strong, w<sup>ch</sup> *Galen* tooke to be the ligament of the *vertebrae*. From it doe spring thirty pairs of sinewes; seven of the neck,

necke, twelve of the brest, five of the loines, and seven from the holes of *os sacrum*.

The first paire in the fore-part commeth out between the nowle-bone and the first *vertebra* of the neck, & is bestowed upon the muscles which bend the neck, which ly under the *esophagus*. In the hinder part it commeth out of the hole, which is common to the nowle-bone, and the first *vertebra* of the necke.

It hath two twigs: The smaller is bestowed upon those which stretch out the necke. The bigger is inserted into the beginning of the muscle which listeth up the shoulder-blade.

The second paire in the fore-part, where it is smallest, it commeth out betweene the second and third *vertebra*, and is bestowed upon the skin of the face. In the hinder part it commeth out at the sides of the processe of the second *vertebra*, but presently it is parted into two twigs. The thicker is

The first  
paire.

Its twigs.

The se-  
cond pair.

bestowed upon the whole skin of the head, even to the crowne. The smaller is bestowed upon the greater, straight, and the lower oblique muscles which stretch out the head.

The third  
paire.

The third paire commeth out of the laterall hole, which is betweene the second and third *vertebra*, and immediately is divided into two branches; whereof that which in the fore-part, hath foure twigs: the first commeth to the long muscle; The second is bestowed upon the muscles which ly under the *esophagus*; The third goeth to the skin of the backe-part of the head. The fourth is bestowed upon the transvers muscles of the necke, and the muscle which lifteth up the shoulder blade; The hindermost branch is bestowed upon the second paire which heaveth up the brest.

The  
fourth  
paire.

The fourth paire commeth out of the hole common to the third and fourth *vertebra*, and hath two branches: The foremost hath three

three twigs. The first is bestowed upon those which bend the necke. The second is bestowed upon the transvers muscle of the necke, and the *cucullaris* of the shoulder blade. The third goeth to the sinewy part of the midrise. The hindermost branch goeth to the backe-bone under the muscles of that part, upon which it bestoweth twigs.

The fifth paire marcheth out betweene the fourth *vertebra*; and hath two branches. The foremost hath foure sprigs; the first goeth to those that bend the necke: the second goeth to make *nervus phrenicus*: the third to the *Deltoides*: the fourth goeth to the *Deltoides* and to the *Coracohyoideus*. The hindermost branch goeth to the *spina*, and is bestowed upon the muscles there.

The fifth  
paire.

The sixth paire commeth out under the fifth *vertebra*, and hath, as the rest, two branches: The foremost sendeth first one sprig to make *nervus phrenicus*: then it goeth to the arme: The second

The sixth  
paire.

The se-  
venth pair

branch goeth to the muscles be-  
hinde which stretch out the neck  
and head.

The seventh paire commeth out  
of the hole common to the sixth  
and seventh *vertebra*. The fore-  
most and largest branch is carried  
to the arme. The hindermost and  
smallest is bestowed upon the  
muscles of the necke, and quadrat  
muscle which pulleth downe the  
cheekes.

## CAP. XV.

*Of the nerves of the vertebra of  
the Brest.*

The first  
paire.

**F**ROM the marrow of the *verte-  
bra* of the brest, twelve paires  
do spring. In all of them, the fore-  
most branch is biggest; but the  
hindermost, which is bestowed  
upon the muscles seated in the back,  
smallest.

The first, springeth out of the  
hole which is common to the  
seventh



seventh *veriebra* of the necke, and the first of the brest. The foremost branch marcheth upwards towards the *sternum*, and bestoweth a twig of *musculus subclavius*, and those which arise from the *sternum*; and that which from the hollownesse of the shoulder-blade. The hindermost branch, lurking under the muscles which cleave to the *vertebra*, is bestowed upon the muscles of the necke, head and shoulder-blade.

The second, issuing out of the place betweene the first and second *veriebra* of the brest, passeth to the armes, and produceth the first intercostall nerve, from whence twigs passe to the muscles seated upon the brest; both the foremost and hindermost branch have the same distribution.

The rest of the ten paires come out of the laterall holes of the *vertebra*, and immediately are divided in two branches; whereof the foremost being larger, make up the intercostall nerves; and being joyned

The second pair.

The rest of the paires.

joynd with the intercostall veines and arteries, and received into the groope of the lower part of each rib. The hindermost march towards the backe-bone, amongst the muscles which cleave to the *vertebrae*, and serve for the stretching out of the brest.

## CAP. XVI.

*Of the sinewes of the marrow of the vertebra of the loynes.*

The first  
paire.

**A**Lthough there be but foure laterall holes in the *vertebra* of the loynes; yet there are five paires of sinewes. The greater foremost goe to the muscles of the belly. The hindermost goe to those which rest upon the *vertebra*. The foremost are tyed together, the first with the second, the second with the third, the third with the fourth, and the fourth with the fifth.

The first commeth out of the laterall

laterall hole betweene the last *vertebra* of the brest, and the first of the loynes: the foremost branch is bestowed upon the fleshy part of the midrise, and the muscle *Psoa*. It sendeth also a twig by the *arteria preparans* to the stone. The hindermost is bestowed upon the *musculus longissimus* and *sacrolumbus*.

The second commeth out betweene the first and second *vertebra* of the loynes. The foremost branch is bestowed upon the *musculus fascialis*, and the skin of the thigh. The hindermost is bestowed upon the *musculi glutai*, and the membranous muscle which stretcheth out the leg.

The third marcheth out betweene the second and third *vertebra*. The foremost sendeth one twig to the knee and skin thereof; and another which doth accompany the *saphena*. The hindermost turneth backe, and is bestowed upon the muscles which rest upon the loynes.

The fourth being the largest of

L 5

the

2

3

4

the muscles of the loynes marching under the *os pubis*, doth accompany the veine and artery, which passe to the leg.

The fifth commeth out between the fourth and fifth *vertebra*, and is bestowed upon the *obturatorius musculus*, and the muscles of the pricke. The hindermost is bestowed upon the muscles and skin which are above the *vertebra*.

## CAP. XVII.

*Of the nerves which come from the marrow of os sacrum.*

The first  
paire,

**F**ROM the marrow of the *os sacrum* sixe paires of sinewes spring.

The first issueth out betweene the last *vertebra* of the loines, and the first of *os sacrum*. The foremost branch of it is bestowed upon the muscles of the belly, and the second which bendeth the thigh. The hindermost is bestowed upon

upon the skin of the buttocks, and the greatest *glutans*.

Of the other five paires.

The other five paires on each side have two paires, whereof the first three goe to the legs. The second under these are bestowed upon the muscles of the bladder and fundament, to the necke of the matrix in women, and to the pricke in men. The last are pent upon the muscles of *os ilium*, and *sacrum* towards the backe part, which are *longissimus*, *sacro-lumbus*, *sacer*, and the *glutai*.

C A P. XVIII.

*Sheweth how the braine is to be dissected.*

THE braine is to be divided in three parts; to wit, the uppermost, the middlemost and lowermost part.

In the uppermost, these parts are to be scene; the windings, the *falx*, and *corpus callosum*.

In.

In the middlemost under the *fornix*, behold the ventricles, the *plexus choroides*, and *cerebellum*.

In the lowermost you shall finde the *infundibulum*, the glandules under it, *processus mammillares*, eight paire of sinewes and the roots of the *spinalis medulla*.

## C A P. XIX.

*Of the outward parts of the eye.*

**V**WE have spoken of that part which is decked with haire: Now we are to speake of that part which is not altogether garnished with haire. In Latine it is called *facies*, in English, Face, because it causeth every one to be discerned who he is.

The parts of it are either common or proper: The common are, *cuticula*, *cutis*, *adeps*: it hath no *membrana carnosæ*, for it endeth in the chin, and the fat is only in the places betweene the muscles. The

parts

Of the  
face.

The parts  
of it.  
The com-  
mon.

parts proper are either containing or contained. The parts containing are the muscles and bones, which are set downe in their proper places. The parts contained are the instruments of the foure senses, to wit, the eye, the eare, the nose, and mouth. First then of the eye, partly because without sight the life is tedious ; partly because the object of it is most subtile. They are in number two ; First to looke aside. Secondly to see by one if the other be lost. Thirdly, to see more distinctly and cleerely.

The proper.

Why the eye is first to bee handled.  
Why two.

In figure they are round : first, because this figure is most capable of the multitude and bignesse of the objects , and fittest for quicke motion. They are seated high, the better to essay, and to governe motion which is foreward.

Their figure.

Their situation.

The parts of the eye are either externall or internall. The externall are in number foure. First, the eye-brow, the seat of disdain and pride. It is framed of the skin, muscles, fat, and haire. The skin is thicke

Its parts.  
The externall.  
The eye-brow.

The motion of the eye-lids.

The hairs of the eye-lids.

The frame of the eye-lid.

The corners,  
The glandule.

thicke and hard to hinder the immoderate growing of haire. It is oblique, the better to turne away those things which might fall into the eye. Secondly, the eye-lid ; in man the uppermost is biggest, and moveth ; but in birds the lowermost is biggest, and moveth.

The haire called *cilia* in the upper lid turne upwards, but in the lower downewards, that they should not offend the eye and sight. They repell small bodies from entering into the eye.

It is framed of the skin the muscularous flesh, and a grasley welt, which keepeth the *cilia* from growing. Thirdly, the corners, the greater is towards the nose, the lesser towards the temples. Fourthly, *caruncula lachrymalis*, the glandule in the greater corner, seated before the hole which passeth into the nose. In it are the holes by the which the teares issue. In it is seated the *fistula* of the eye.

CAD



CAP. XX.

Of the tunicles of the eye.

**T**HE inner parts are in number five, the first is the fat, which first defendeth the eye from cold : secondly, keepeth it from the hardnesse of the bone: Thirdly, moisteneth the eye: Fourthly, filleth the distance betweene them. Secondly, the fixe muscles, which are set downe in their proper place. Thirdly, the tunicles, whereof the first is called *conjunctiva* and *adnata* ; because it cleaveth firmly to the eye, and keepeth it within the *orbita*, that it start not out in violent motions. It covereth the halfe of the eye orbicularly, but it springeth from the *pericranium*. The second is *cornea*, because it is like to a Lanterne horne in firmnesse and brightnesse ; it may be severed into many skins. In the fore-part it is thinner and brighter ; but in the hinder-part thicker and

The use of the fat.

The muscles.  
The tunicles.

3

The pupil-  
la.

4

The cry-  
stallin.

5

and darker. It is thin, that the *visibiles species* may the more readily be carried to the cristallin humour. It is smooth also: for if it were wrinckled it would have hindered the sight. It springeth from the *dura mater*. The third is *uvea*, because it is like to the huske of the black grape, for in colour it is not unlike, and smooth without, and rough within. It is of sundry colours, the better to apprehend colours. The inner side is blacke, that a weake light might the better be seene by the cristallin; for light in a darke place shineth the more brightly. It springeth from the *pia mater*. In the middle it is perforate, which maketh the *pupilla*: this is nothing else but the hole of *uvea*. The circle about the *pupilla* may bee separated from the *uvea* in an Oxes eye boiled. Fourthly, *Cristallina*; it is a membrane thin and cleere, compassing the cristalline humour thinner before than behinde. Fifthly, *vitrea*; it is very thin, white, and smooth: If it be

be cut, the *vitreus humor* issueth out.

## CAP. XXI.

## Of the humours of the eye.

THE humours make up the fourth internall part. They are in number three; *aqueus, crystallinus, vitreus*. The first is the watrish humour, so called, because it runneth as water; it hath no tunicle, it not only filleth the cavity betweene the *cornea* and the cristallin humour; but compasseth also the vitreous humour; for if you cut the eye behinde, it will as well runne out there as before. The waterish humour is kept together by some small thred-like substances. They are under the circle of the *uvea*, and by reason of them the cataract groweth. This texture of filaments is by some called *tunica ciliaris*, so called, because they are blacke and like to the

I

Where  
the cata-  
ract grow-  
eth.

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the eye-brees, but improperly. The second is the crySTALLIN humour, so called, because it resembleth a crySTALL or Ice; it is of a compact waterish substance. It is plaine before, that there might be a competent space for the receiving of the visible resemblances; for the which use a round figure was not fit, yet it is round behinde, where it sticketh in the humour vitreous. It causeth every thing seeme bigger. It is placed not in the middle of the eye, but neere to the *pupilla*. The third humour is the *vitreous* or glasse-like humour; for it is like to moulten glasse. It is placed behinde, that if any thing should escape the crySTALLIN humor, it might be stayed there, and not returne to the *nvea*. It receiveth the crySTALLIN humour as a soft pillow, wherefore it is softer than it. It is more copious than the other two; it is stayed by some filaments, these being by incision separated, the glasse-like humour runneth as water. The fifth internal

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ternall part the vessels make. The externall veines proceed from the externall jugulars ; the internall from the *plexus choroides*. The externall arteries spring from the externall foporals ; but the internall from the *rete mirabile*. There bee two nerves appointed for each eye, one for motion called *motorius*; the other for sight called *visorius*, this is softer.

The fifth  
internall  
parts.

## C A P. XXII.

### Of the Auricula.

**N**OW followeth the instrument of hearing, the eare. The eares are two, that the one failing, yet we might heare with the other. They are placed in the head, because sounds ascend ; and because we have alwaies need of this sense.

The parts of the eare are either outward or inward. The outward is called *auricula*; of it some parts are

The parts  
of it.

are common, some proper. The common are, *cuticula*, *cutis*, *membrana nervea*, *caro*, and fat in the lobe. The skin is thin ; under it there is small store of flesh, which is tyed to the cartilage by a membrane. The lobe, by reason of the flesh and fat, seemeth fleshy, and fatty. The proper parts of the *auricula* are the muscles, veines, arteries, sinewes, and the cartilage. As concerning the muscles, they are set downe in their proper treatise. The veines come from the externall jugulars; the arteries from the soporalls; the nerves from the second paire of the necke. The cartilage was fittest for this place. If a bone had beene here, it had beene troublesome, and easily broken: if flesh, it had beene subject to contusion, and could not have repelled the sound. It is tyed to *os petrosum* by a strong ligament, which riseth from the *pericranium* to stay it up.

Its uses.

The uses of the outward eare are these : first, it serveth for beauty. Secondly,

Secondly, to helpe the receiving of the sounds the more readily : for first, it gathereth them, being dispersed in the aire. Secondly, it doth moderate them, that they come gently to the *tympanum*. The haire here hindereth the creeping in of insects.

C A P. XXIII.

*Of the inward parts of the eare.*

THE inward eare is framed of foure cavities, and their furniture. The first is, *meatus auditorius*, which is alwaies open; it hath windings, lest the aire should suddenly rush in upon the *tympanum*. It is oblique; to abate the vehemency of a sound. It marcheth upwards, that if any thing should goe into it, it might the more readily fall out. It endeth at the *tympanum*, and containeth the eare-wax, by the which the braine is purged, and insects hindered from  
creeping

creeping in, entangling them as bird-lime. It endeth at the *sympanum*.

The drum.

This membrane is very dry, that it might give the better sound. It is thin and cleere, that the sounds may be the more readily sent to the internall aire. It is strong that it should the better endure externall harmes. It hath a cord for strength and stretching of it, even as the Military Drum hath. The second cavity by *Vesalius* is called *pelvis*, the tunel, by *Fallopianus conchia*, the perwinkle, from its figure.

*Pelvis.*

The use of the things contained in it.

The three little bones.

I

The furniture of this cavity serves for three purposes, for motion, for transmission of sounds, and for the expurgation of the excrements; for motion, the three little bones, the ligament and muscles doe serve. The little bones are in number three; the first is *malleolus*, the little hammer. It hath a thicke and long head, cleaving to a narrow and small necke. It hath a smooth cavity to be articulate with the anvil. It hath two processes



cesses springing from the necke; unto the upper, which is the lesser and crooked, the corde of the Drum cleaveth. The membrane resteth upon the lower. The second is *Incus*, the anvil, having a head and two feet. The head is somewhat thicke. In the top of it there is a smooth cavity which receiveth the knob of the hammer. The smallest and longest foot is tyed to the top of the stirrop; but the thickest, broadest, and shortest resteth upon the *os squamosum* of the temples. The third is *Stapes*, or the stirrop, In figure triangular, in the middle hollow to give way to the passing of the aire to the *labyrinthus*. In the upper part of it, is a very small and round knob, upon the which the longest foot of the anvil resteth, the basis is set to the ovall hollownesse, and the membrane shutting it.

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These bones have no *periostium*, for then they would be unfit to returne any sound. Secondly, they have neither cartilage nor marrow,

The qualities of these bones.

row, for they must be hard. Thirdly, in infants they are as perfect and big as in men. Fourthly, they are placed up by a ligament, that being shaken by the internall aire, moved by the externall, the sharper sound may be caused.

Its uses.

These bones have these uses; First, they strengthen the *tympanum*; therefore the hammer with one of the feet of the anvil lean upon the Drum. Secondly, by shaking of the *tympanum* they moved bring the better the sound to the auditory nerve. Thirdly, they further the receiving the diversity of sounds, as the teeth the distinction of words. Last of all, for motion the muscles are appointed: one is without the Drum, above in *meatus auditorius*, whose tendon is inserted into the *tympanum*, against which the *malleolus* is inserted to draw it outwards together with the hammer. The other is within the Drum in *os petrosum*, inserted by a double tendon in the hammer to draw it backe.

The

The third cavity is called *labyrinthus*, because it hath sundry windings. There are fixe semicircles in this cavity. The end of these windings is to mitigate the sound which was redoubled within the *concha*, as an *eccho*.

The fourth cavity is called *cochlea*, or a wilke, so called, from the figure; for it hath three, sometimes foure wreathings: within there is a chinke, by the which the sound passeth to the braine, and the bilious excrement falleth into the aire.

The hearing is thus caused, The aire passeth through the first cavity, and gently beatech upon the drum, which being shaken, tosseth the three bones joyned to it. Then the kinde of sound is impressed into the inward aire, which having the quality of the sound, and being circulate through the windings of the labyrinth to make it purer, is conveyed by the *chochlea*, and delivered to the auditory nerve that the animall spirit may

The third cavity.

Fourth cavity.

How the hearing is caused.

present it to the common sense the judge of all species.

# CAP. XXIV.

## *Of the Nose.*

The externall parts.

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**T**HE instrument of the third sense, smelling, ensueth, to wit, the nose. The parts of the nose are either externall or internall. The externall parts are these, the skin, the muscles, the veines, arteries, nerves, bones, and cartilages. First, the skin cleaveth so fast to the muscles and cartilages that it cannot be severed without renting. Secondly, as for the muscles, they are set downe in the description of muscles. Thirdly, the veines come from the externall jugulars, as the arteries from the soporall. Fourthly, the sinewes come from the third paire, on each side one. Fifthly, the bones of the nose are set downe in the doctrine of bones. Sixthly, the cartilages

are

are in number five ; the two upper make up the halfe of the *ala*, the two under make up the other halfe ; the fifth divideth the nose-thirles : the cartilages are only moved by the muscles.

The inne parts.

The inner parts of the nose, are these : First, the membrane which covereth the inside of the nose, which proceedeth from the *dura mater*, and passeth through the holes of the ethmoides bone. Secondly, the musculous membrane, which draweth together the nose-thirles. Thirdly, the haire which disperse the aire and hinder the creeping in of insects. Fourthly, the red fleshy spongius substance, with the which holes of the ethmoides are filled up ; from this the *polypus* springeth. The length of a comely nose is the third part of the length of the face. The upper part of the nose w<sup>ch</sup> is bony, is called *dorsum nasi*, the ridge, *spina*. The lateral parts where the cartilages are, *ala pinna* ; the tip of the nose *globulus*, *orbiculus*, *pyrula*. The fleshy

The denomination of some parts.

The uses  
of it.

part next to the upper lip, *columna*.

The uses of the nose are these; First, by it the aire is sent to the braine, for the generation of the animall spirits. Secondly, the lunges by it draw in aire for the refreshing of the heart, and the generation of the vitall spirits. Thirdly, smells by it are carried to *processus mammillares*. Fourthly, by it the braine dischargeth its excrements. Fifthly, it furthereth the speech. Sixthly, it beautifieth the face. Seventhly, it parteth the eyes, that the one should not see the other, which would have hindered the sight. Eightly, it is a defence to them also, and stayeth the visible resemblances. Ninthly, By fleering up, it expresseth anger, so that in the Hebrew tongue it signifieth anger.

CAP.

## CAP. XXV.

*Of the Lips.*

**N**OW last of all, followeth the mouth, wherein is contained the tongue, the instrument of tasting. The use of it is foure-fold ; for it serveth for breathing, taking of food, speaking, and discharging of the excrements of the braines, lunges, and stomacke.

The parts of the mouth are either externall, or internall : The externall are the lips ; these are framed of a fungous substance, and the ends of the muscles covered with the skin : They are in number two, the upper and the lower. Of the muscles of the lips, sufficient is spoken in the proper place. The lips within are covered with a membrane common to the mouth and stomacke ; and from hence commeth the trembling of the lower lip before vomiting. The parts which touch one ano-

The externall  
parts of  
the mouth

ther are red , by reason of the afflux of blood. The colour of these are diligently to be observed in diseases.

The uses  
of the lips

The uses of the lips are these : First, they serve for the conveniency of eating and drinking. Secondly, for the beautifying of the face, if they be well fashioned. Thirdly, for the containing of the spittle in the mouth, that it should not runne out at unseasonable times. Fourthly, to keep the gums and teeth from externall injuries. Fifthly, for framing of the speech. Sixthly, for kissing.

## C A P. XXVII.

*Of the inner parts of the  
mouth.*

**T**HE inner parts of the mouth are these ; The gums, the teeth, the *palatum*, or roose of the mouth, the almonds, the *uvula*, and tongue. The gums, they are fleshy



fleshy substances, destitute of motion, appointed for the keeping of the teeth in their sockets. As for the teeth, look for them in the doctrine of bones. The roose of the mouth is vaulted, that the aire being repercussed, the voice may be the sharper. The skin there is wrinkled and rough, that the white hard membrane should the more firmly cleave to the bone, and keepe the meat together while it is a chewing. Of the almonds, and *wula* we have spoken in the discourse of the necke. The last of the inner parts is the tongue: In figure it is pyramidal: it is composed of flesh, muscles, ligaments, and the skin that covereth it. The skin that covereth it is of an exquisite sense, and proceedeth from the *dura mater*. The flesh is spongius, and such as is not in any part of the body: that it might receive the qualities of sapers, and judge of them the better. From hence it commeth, that it doth imbibe the fumes and vapours of the humours

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4. 5

6. The  
tongue.  
Its parts.

Its motion.

Its division.

The cause  
of tongue-  
tying in  
children.  
The vessels.

predominant in the body, which by its colour it doth declare. The tongue moveth forward, backward, to every side; it is contracted, thrust out, and doubled. Look for the muscles appointed for these motions in their proper place. Although it seeme but one continuall member, yet it is divided into two parts by a line going alongst it. And in the palsey of one side of the body, one halfe of the tongue may be affected, the other remaining sound. Of the ligaments, the lower, which is called *frannum*, as in the pricke, is most remarkable: By this part, Nature sheweth that moderation is to be observed in the use of these members. If this ligament be extended to the top of the tongue, it hindereth sucking in children, so that they are said to be tongue-tyed. The veines proceed from the externall jugulars under the tongue, they are called *ranulares*, from their colour. The arteries come from the soporalls. Sinewes it hath from the third and seventh

Its uses.

seventh paire. The uses of the tongue, are these ; First it is the instrument of tasting : Secondly, it uttereth the speech : Thirdly, it helpeth the chewing of meat, by tossing of it too & fro, & turning it downe to the stomacke. Fourthly, it serveth for licking, from whence in Latine, it is called *lingua a lingo* from licking.

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M: 5 THE

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THE FOVRTH  
B O O K E.

A description of the  
veines, arteries, and  
sinewes of the lims.

C A P. I.

*Of the veines of the Arme.*



*Arms subclavius*, or  
the branch of the *vena*  
*cava*, ascending under  
the cancell-bone, when  
it is come to the arme-pit, it is cal-  
led *axillaris*; and it parteth it selfe  
in two veines, the *cephalica*, and  
*basilica*.

The

The *cephalica* in beasts doth wholly spring from the externall jugular ; but in man it receiveth only a spring from the externall jugular. Wherefore in diseases of the head , it is not without cause opened. It passeth through the upper and outward part of the arme, to the bending of the elbow : where it is divided into two branches ; of the which one , joyning with a branch of the *basilica*, makes the *mediana*. Wherefore the slope branches, which usually are opened about the bending of the elbow , are only branches of the *cephalica*, and *basilica*, which meeting, make the *mediana*. The other branch of the *cephalica* marching , according to the length of the *radius* , reacheth to the hand, through which it is spread ; but chiefly that part which is between the ring-finger and the little finger.

There the *Salvatella* is placed, which is to be opened in melancholy diseases. The *basilica* passeth through

through the inner and lower part of the arme, accompanied with the artery and nerves.

About its begining it maketh the *thoracica*, which having three or foure sprigs, and passing under *serratus major*, and the subscapular muscle, it is tyed to the upper intercostall, and about the *spina dorsi* is inosculate with the twigs of *vena sine pari*. *Basilica* about the bending of the elbow is divided into that which is called *subcutanea*, and that which is called *profunda*.

*Profunda* the deeper, is annexed to the artery about the bending of the elbow, not under. Then passing betweene the focils, it is carried to the hand by the outer part of the *ulna*.

The *subcutanea* or the shallowest branch neere to the bending of the arme, being turned up to the outer part of the *ulna*, by the length of it, it is carried to the hand.

The *Mediana* passeth to the inside

inside of the hand by the middle part of the *ulna*.

## C A P. II.

### Of the Arteries of it.

**R**amus *subclavius* so called, as that of the *vena cava*, when it is come to the arme-pits, it is called *axillaris*. It accompanieth the *basilica* : for there is no cephalicall artery. Neere to the arm-holes, it yeeldeth that artery, which is called *thoracica*, from thence being carried to the bending of the arme, it is parted into two branches, which passe to the inner side of the hand ; for the outside of the hand hath neither muscles nor artery.

The one of these resting upon the *radius*, is that which is felt about the wrest.

The other marching by the *ulna* is with, its fellow, spread through the hand.

## CAP. III.

Of the sinewes of the  
Arme.

OUT of the perforations of the foure lower *vertebra* of the necke, and of the first two of the backe, fixe sinewes spring, which by the muscle called *scale-nus*, are carried under the cannell-bone to the arme-pit, where they are twisted together; from these the foure uppermost, accompanying the *basilica* and the artery under the *deltoides* muscle, are scattered through the inner side of the arme. The fifth & sixth, turning up under the *rotundus major*, are inserted into the hindermost muscles of the shoulder-blade. Foure remaine, which passing along the arme, are spread into the elbow and hand.

The first being carried under the inner side of the *biceps* doth joyn it selfe with the *cephalica*.

The second being undivided and thicker,



thicker, goeth downe to the bending of the elbow, being covered with fat, and there is under the artery and the *basilica*; but about the wrist it is above the veine. About the wrist it is divided into ten branches, imparting to every finger two sprigs, which passe along the sides.

The third being entire also is carried along the elbow by the wrist to the little finger: where divided into foure twigs, it is bestowed upon the outside of the hand.

The fourth being thickest of all, is carried from the artery and veins by the backside of the arme to the *radius*; where being joyned with the *Cephalica*, it endeth at the wrist.

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#### C A P. IV.

##### *Of the veines of the Foot.*

**T**HE crurall veine sendeth a branch to *musculus triceps* called

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called *Tschia*, and is divided into foure branches : of the which two are in the inside of the thigh, and so many in the outside. The one of the externall is sent to the fat of the thigh, the other passing according to the length of *musculus fterius* to the ham ; and from thence to the inner ancle, maketh the *saphena*. Of the inner branches the one lying high, is joyned with the crurall artery, and passing through the outside of the ham, is carried to the outer ankle : the other lying deeper, as it passeth, bestoweth twigs to the adjacent parts, and about the ham, maketh the *poplitea* ; from thence being carried betweene the fociis by the chinke of the inner ankle, it is bestowed upon the soale of the foot, as the *saphena* was upon the outward parts. The veines have valves within like to a halfe moon; without they are like knots : they are most commonly two together, one on each side, leaving some distance betweene, partly to strengthen the  
the

the coats of the veines, partly to rule the motion of the blood.

The arteries have no valves in their progression, that the vitall spirit may speedily, as the beames of the Sunne, passe to the furthestmost parts.

C A P. V.

*Of the Arteries of the foot.*

**A** *Rteria cruralis*, or the crurall artery, a little below the groyne, doth send two branches through the muscle *triceps* to the *glutis*, or muscles of the buttocks. Afterward it sendeth two to the forepart of the thigh; then undivided, it passeth to the ham, where it is divided into two branches, whereof the one passeth by the side of the outward part of *tibia*, above the muscle *peroneus*, and is bestowed upon the upper part of the foot; the other entering into the *solanus*, and passing to the *pterna*, is dispersed

persed through the soal of the foot. The *saphena* is not accompanied with an artery, and the nerve is not very neere unto it, so that it may be safely opened.

## C A P. VI.

### *Of the nerves of the Foot.*

**F**ROM the three lowermost *vertebra* of the loynes, two sinewes spring in the forepart of the thigh, severed first, and then being united, passe to the groyne. There it is divided into five branches, compassed with a membrane, which dispersing themselves on every side into the muscles of the forepart of the thigh, even to the *rotula*, there being, cannot be discerned, unlesse the muscle *psoa* be rent; within the which they lye hid. Then besides these, you shall see another small nerve passing the ovall cavity of *os pubis*, to be spent upon the *triceps*. Through the  
back-part

backe-part of the thigh, a great and thicke nerve passeth framed of three, which spring out of the three upper holes of *os sacrum*, and being carried by the sinus of *os ischium*, through the inner and back muscles of the thigh, to the ham, there it is parted into two branches.

The one goeth downe by the belly of the *tibia* unto the *perna*, bestowing twigs as it goeth, passing by the chink of the inner ankle to the soal of the foote, it is severed into as many branches as there are toes. The other branch marching upon the *perone*, is carried to the instep of the foot by the outer ankle. By reason of this great nerve, they who are troubled with the *sciatica*, finde paine not onely about the joynt of the thigh, but in the leg also, and foot. About the beginning of this nerve, another issueth out of the third hole of the *os sacrum*, and being carried above the ridge of the *os sacrum*, it brancheth it selfe into the muscles

muscles of the buttockes, and those which bend the *tibia*.

# CAP. VII.

## *Of the Nerves of the spinalis medulla.*

**I**F you invert the braine, you shall perceive foure roots of the *spinalis medulla*, two from *cerebrum*, and so many from *cerebellum*: these joyned together make it up. It is of the like substance with the braine; but besides the two membranes, wherewith the *cerebrum* is compassed, this hath a third, strong, and nervous proceeding, either from *os occipitis*, where it is joyned with the spondils, or from the ligaments of the *vertebre*: this strengthneth the *spinalis medulla*, and keepeth it from tearing in violent motions. From the beginning to the end it groweth narrower and harder, so that when it is come to the end of *dorsum*, it endeth

endeth in small threds like a horse taile, that no danger should be in that part where the whole *spina* is bended.

The nerves of the *spinalis medulla*, are framed of sundry filaments twisted together, and covered with a thin membrane; and as they come out of the holes of the back-bone, nature doth compasse them with a thicke and firme substance; which so firmly clip the fibres of the sinewes that they cannot be severed. Besides the sinew cometh not out of that hole, directly opposite to its beginning, but out of the lower.

And when it hath passed through this hole, it doth not enter presently into the rib, which is next, but into the lower. Which when it hath touched, being divided, it turneth the lesser twig towards the *spina*, and the greater towards the fore-part. Out of this *spinalis medulla* twenty eight paires of sinewes spring, seven from the neck, twelve from the backe, and five from

from the loines and foure from the *os sacrum*.

The first Conjugation of the necke, doth not spring from the sides of the *spina* as the rest; but from the fore and hinder-part, and commeth out betweene the *occiput* and the first *vertebra*. The fore-branch is bestowed upon the muscles of the backe side of the head, and the muscles of the *vertebra* of the neck.

The second Conjugation, by the hindermost branch turned up, ascendeth to the skin of the head, the eares, and the muscles; but by the foremost branch it is carried unto those muscles, which are common to the second spondill, and the *occiput*.

The third conjugation sendeth its foremost branch to those muscles which bend the necke: but the hindermost to the muscles which raise up the neck and head.

The fourth conjugation sendeth its lesser, and hindermost branch to the muscles of the necke; but the



the foremost and largest to the muscles which lift up the shoulder-blade and the arme.

The fifth conjugation with its lesser twig turneth to the hindermost muscles of the necke : and with the greater joyneth it selfe with the twigs of the fourth paire.

The sixth Paire by the lesser and hindermost branch passeth to the hindermost muscles : but with the foremost and biggest to the arme, and the *diaphragma*.

The seventh with the greater branch passeth to the arme, but with the lesser to the hindermost muscles.

As for the nerves of the backe, each of them hath two branches, one lesser, which is sent to the muscles of the backe ; and one greater, which is bestowed upon the intercostall muscles.

One thing is to be noted, that the sinewes which proceed from the *vertebra* of the short ribs are bigger than those which are communicate to the upper intercostall muscles.

muscles. Those about the middle of the rib are divided into two twigs; whereof the uttermost is carried outward, but the innermost inwardly along the rib. These nerves were to be biggest, because they are distributed both to the muscles of the belly, and to the parts contained in it.

As for the nerves of the loynes, each paire of these hath anterior and posterior branches, which are spent partly upon the muscles of the loynes, and *hypogastricum*; partly upon the legs. The *lumbares nervi*, or sinewes of the loines, meet, and are mingled with the *costales*. Whereby it commeth to passe, that the parts which are contained within the *peritonaeum*, have their strength from the *spinalis medulla*, as their sense from the braine: for according to *Galen*, cap. 5. lib. 16. de *us. part.* the costall nerve is a sprig of the sixth conjugation.

As for the nerves of *os sacrum*, the first paire hath two branches, as those of the loynes; to wit, the  
anterior

anterior and posterior ; but the rest  
of the paires before they come out,  
are double on each side : and on  
each side one nerve marcheth for-  
ward and another backward. The  
uppermost three, which are an-  
terior, go to the leg : The two low-  
ermost passe to the muscles of the  
arm and bladder.

N

The

The explication of the third  
Figure.

1. The musculous skin of the head.
2. The muscles of the arme.
3. The muscles of the brest
4. The muscles of the belly.
5. The muscles of the thigh.
6. The muscles of the legs.

This Figure is to be placed before  
the first Chapter of the Treatise  
of the Muscles.

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Fig. III.



THE FIFTH  
B O O K E.

Containing

A Treatise of all the Mus-  
cles of the Body.

C A P. I.

*The description of a Muscle.*

**A** Muscle is a dissimilary  
part, framed of its proper  
membrane, a fibrous  
flesh, a tendon, veines, arteries, and  
nerves, appointed by nature to be  
the instrument of free motion. The  
parts then are either common, or  
proper. The common are three: five.  
The veine, the artery, and the  
Nerve.

The de-  
scription  
of a mus-  
cle.

The parts  
constitu-

Veines.  
Arteries.  
Nerves.

The flesh.

The fibres

The fibres  
spring  
from the  
nerves ac-  
cording to  
*Galen.*

nerve. The proper so many; the fibrous flesh, the membrane, and the tendon. The veines afford nourishment, the arteries life, and the nerves motion. These spring either from the braine, or from the *spinalis medulla*. It is implanted either in the beginning, or about the middle of the muscle. The nerve as soone as it hath entred into the substance of the muscle, like unto a shrub, it is dispersed into a number of twigs, which at the last end in it, and become inconspicuous. The fibrous flesh is extended onely according to the straight position of the *fibre*, whereas the flesh of the other parts hath no certaine position. The fibres of every muscle are alwaies straight: wherefore the muscles of the belly have not their denomination from their fibres, for they are all straight; but from position and situation: so that the muscle called *masseter* is accounted double, seeing it hath two sorts of fibres, one lying upon another. Every muscle



muscle hath a proper membrane; It is so; more properly named than a coat: for veines and arteries are properly said to have coats. The membrane doth either spring from the tendon, or is framed by nature in the very first conformation of the parts. The last proper part of the muscle is the tendon. It is a similiary body, framed of the seed of a sinewy like substance, onely (for it hath a peculiar substance differing from a sinew) white with a kinde of brightnesse, thicke, hard, and smooth, extended according to the length of the muscle. It is ten times bigger than a nerve: It beginneth at the head of the muscle, passeth through the belly of it, and endeth in the taile, as manifestly appeareth in the foot of a Cocke. All muscles which are appointed for the moving of bones, have tendons; but those which move other parts, as the tongue, lips, bladder, and the anus, seldome have. It is said to spring from the bone; this is to be understood by

The membrane.

The tendon.

Which muscles have tendons. How it springeth from the bone.

It is the  
principal  
part of a  
muscle.

From  
whence it  
hath its  
motive fa-  
culty.

Its materi-  
all cause.

reason of its insertion, but not pro-  
duction. It is the principall part of  
the muscle, and not the fibrous  
flesh: first because it only hath  
strength to lift up the bones: se-  
condly, because it onely is fit to  
contract it selfe, whereas the loose  
and soft flesh is neither able to lift  
up the bones, nor to contract it  
selfe. Thirdly, because there is not  
such a part in all the rest of the bo-  
dy. It hath its motory faculty  
from the nerve by influence, as the  
load-stone draweth the iron, and  
the cramp-fish doth benumme the  
hand of the fisher-man by the  
pole. It is framed by nature of the  
seed in the first conformation, and  
not of the nerve and ligament  
mingled together: First, because  
a nerve being somewhat soft, will  
not admit commixtion with the  
ligament, being hard. Secondly,  
because the nerve is not carried to  
the tendon, but doth end into in-  
conspicuous threds. Thirdly, Li-  
gaments are insensible, but ten-  
dons are of exquisite sense; as  
appea-

appeareth by the great pain which ensueth if they be pricked. Fourthly, because the ligaments of the bones have the composition of membranes: for they are made of straight and transvers fibres, as a web; whereas the tendons have only straight fibres. The tendon beginneth at the belly of the muscle, for there it is bigger and stronger than in the head or taile. The tendons are sometimes round, as in the *musculus biceps*; sometimes membranous, as in the muscles of the belly. These are the parts constitutive of a muscle. It hath besides these, parts derived from the position; and those are, three: The head, the belly, and the taile. The head is the beginning, this is in the part unto the which the muscle is contracted; the belly is the thickest part, the taile is the ending of it, and it is inserted into the part which is moved. It is called *ἀρτηροειδής*, and commonly *Tendo*. The substance of the tendon in all these parts is uniforme.

Its beginning.

The figure of tendons.

The parts from the position.

The use of  
a muscle.

The di-  
vers parts  
of a mus-  
cle.

The use of a muscle was set downe in the last part of the description, in that it was said to be the instrument of free motion, and not voluntary, because beasts have muscles, unto whom will is denyed, because it presupposeth reason. A muscle in motion performeth that which a leaver doth, when as such a heavy weight is to be lifted up, which cannot be done with the hands only. Seeing in every organically part there are foure kinds of parts (according to *Galen*, 1. de *us. part.* 6. 8.) The tendon is the principall part, which is sometimes altogether united, sometimes divided. The nerve is that part without the which the motion cannot be performed. The flesh bettereth the action. The rest of the parts helpe and further is.

CAP.

## CAP. II.

Of the differences and action  
of Muscles.

THE differences of muscles are taken from sundry things: First, from their substance: so some are fleshy, as sundry of the tongue and *larynx*: some are membranous, as the *constrictores* of the nose: and some are partly fleshy, and partly nervous, as the temporal. Secondly, from the quantity. The greatest of all is the first of those which extend the breast; for it doth ascend from the end of *os sacrum* to the first *vertebra* of the *thorax*. The least of all is the internall muscle of the eare; the rest are of a meane bignesse, and come neere either to the biggest or the least. From the quantity the muscles, are called either long, broad, or thicke. Thirdly, from the situation: from hence some are called externall, some internall, some

From whence the differences of muscles are taken

The greatest and smallest muscle.

The  
causes of  
the unity  
and plura-  
lity of  
muscles.

oblique, some straight, some transverse. Fourthly, from the figure: as *deltoides*. Fifthly, from their beginning: so some proceed from bones, some from cartilages, as those of the *larynx*; some from tendons, as the *lumbricales*. Sixthly, from the variety of parts; so some are called *bicipites*, having two heads. Seventhly, from their composition; so some are single, some double; because some have more heads, some more tails. The unity of the membrane and belly, which wrappeth the muscle, causeth the unity of it; and the plurality of the membranes and bellies, the plurality of the muscles. Eighthly, from their action: Four differences of muscles are taken from hence: for first, some are hence called *fraterni*, or *congeneres*, brotherly; some *antagonista*, adversaries. Secondly, some onely move themselves, as the sphinters; some other parts, as the rest. Thirdly, some have one onely action, as the greatest part of the muscles; some

some have divers actions, as the *masseter* and *trapezius*. The fourth difference is taken from the variety of the action; so some are called *flexores*, some *extensores*, some *rotatores*, some *supinatores*.

As for the proper action of the muscle, it is nothing else but the contraction of it towards its beginning. Now two things ensue after this contraction; for first, the part into which the muscle is inserted, must be apt to move: secondly, it must be drawne towards the beginning of the muscle. The diversity of the action proceedeth from the diversity of the situation of the muscles: so a straight muscle hath a straight motion; a transvers, a transvers motion; an oblique, an oblique motion; and that which compasseth a part hath an orbicular motion, as the sphinters. Now of the motion of the muscles there are four differences; first, the contraction: secondly, the perseverance of the contraction: thirdly, the

The proper action of a muscle.

The cause of the diversity of the action.

The differences of the motion of muscles.

*Motus o-  
nicus.*

The effi-  
cient  
cause of  
the moti-  
on.

A descrip-  
tion of a  
muscle  
from its  
action.

the relaxation of the contraction :  
and fourthly , the perseverance of  
the relaxation. This perseverance is  
called *motus tonicus* , when as the  
member is still kept in the same  
posture ; which is performed by  
that faculty which governeth the  
body. The efficient cause then of  
the action is the soule , moved by  
its appetite. It useth three instru-  
ments, the braine, the nerve, the  
muscle : the braine receiveth the  
charge, the nerve carrieth it to the  
muscle , and the muscle doth per-  
forme the action ; so that a muscle  
from the action may thus be des-  
cribed ; A muscle is an organically  
part of the body, appointed for the  
free contraction of it selfe towards  
its beginning, for the moving  
of the part into the which it is in-  
serted.



CAP. III.

Of the muscles of the Eye-lids.

**E** Ach eye-lid hath foure muscles : the first is *frontalis*, to lift it up ; the second is *orbicularis major*, or the larger round muscle under the frontall : the other two are called *Ciliares*, or of the eye-lids : In each of them there is one to shut the eye-lids. The motion of the upper is manifest, but of the lower obscure. In breadth they exceed not the breadth of the cartilage. To shew the frontall you must divide the skin of the forehead where the haire beginneth untill you come to the eye-brow. *Orbicularis major* lieth under the frontall, and appeareth when the skin of the eye-brow is removed. The *Ciliares* compasse the eye-lids orbicularly.

The occipitall, or nower muscles, meet with the frontalls, or those of the fore-head, in the upper part.

part. The occipitalls beginne on each side of the nowle, and marching upwards by a broad and membranous tendon to the eares, meet with the frontalls. If these be very fleshy, they are able to draw backe the whole skin of the head.

## CAP. IV.

*Of the muscles of the Eye.*

The  
straight  
muscles.

The be-  
ginning,  
and inser-  
tion of  
them.

THESE are in number sixe; foure straight, and two oblique. The first of the straight is called *attollens*, or *superbus*; that which pulleth up the eye. The second is *deprimens*, or *humilis*, that which draweth downe the eye. The third is *adducens*, or *bibitorius*; that which pulleth the eye to the nose. The fourth is called *abducens*, or *indignatorius*, that which pulleth it from the nose.

All these spring from the cavity of the bone, making the orbit of the

the

the eye about the hole of the opticke nerve ; and being compassed with much fat , passing under the *conjunctiva* , end by a broad, but thin *aponeurosis* , in the *cornea* , or hornie membrane, where it be-  
 ginneth to booleere.

The oblique muscles are called *circumagentes* , winders about, and *amatorii* , or love-makers , and are in number two ; the first is *obliquus major* , seu *superior* , the uppermost and largest. This be-  
 ginneth within the orbit of the eye , by the hole of the opticke nerve, and passing to the upper part of the great corner of the eye , endeth in a small tendon , which passeth through a transvers cartilage there placed, as a cord through a pully , and is inserted into the upper side of the *cornea* . The second is *obliquus minor* , or inferior, the lowermost and smallest. This springeth from the lower , and almost outer part of the orbit , about the chinke , which doth unite the bones of the upper jaw-bone,

The ob-  
 lique mus-  
 cles.

bone, neere to the glandule, and passeth obliquely to the outer corner of the eye, and in the upper meeteth with the tendon of the other oblique muscle. This bringeth the apple of the eye to the nose, as the other draweth it from it.

How these muscles are to be shewed.

Before you shew the muscles of the eye, cut off the fat with the cistars; then shew first the *obliquus major*, then the *obliquus minor*, and last of all, the foure straight muscles. Nevertheless let the *obliquus major* remaine last, when all the rest are taken away, that you may shew the tendon of it passing through the pulley the more plainly.

## CAP. V.

### Of the muscles of the nose.

The raising up muscles.

THE nose hath sixe muscles, whereof there be *erectores*, or raisers upwards, two; one on each side of the nose. They begin where the

the hole is under the glandule; and so cleaving to the bone, are outwardly inserted and carried to the *Pons*, or sides of the nose.

There are two also called *dilatatores*, or openers, on each side one, which dilate the nose-thrills, not raising up the nose. They are like to a leafe of the myrtle tree. They have their beginning from the bone of the upper jaw, neere to the sides of the nose, and being placed about the cartilage, end in the top of the nose, called *pirula*, the tip.

The stretch-  
ing mus-  
cles.

There be also two *constrictores*, pullers together of the nose-thrills. These are small and membranous, hid under the membrane which covereth the inside of the nose. They have their beginning where the bone of the nose endeth, and are implanted in the inner side.

The pul-  
lers toge-  
ther.

## CAP. VI.

## Of the muscles of the lips.

The com-  
mon mus-  
cles.

I

THE muscles of the lips are either common to the cheekes and lips, or proper onely to the lips. The common are two; the first is *zygomaticus*, or *detrabens quadratus*: this is a thin muscle, resembling a membrane, enterlaced with fleshy fibres. This hath its beginning from the *vertebra* of the neck in the outer side, the shoulder-blade, the cannon-bone, and the brest-bone, and mounting up by oblique fibres to the face, is implanted in the chin, where the two lips are joyned: this muscle doth draw the cheekes downward. The second is called *buccinator*, or *bucco*; this lieth under the former, in the upper part of it. It doth make up all that part of the cheek which is blowne up when a trumpet is sounded. This springing from the brimmes of the upper jaw-bone

2

circu.

circularly, doth end in the brims of the lower jaw-bone. It is wholly membranous, and interlaced with divers fibres, and is so covered with the membrane which covereth inwardly the mouth, that it hardly can be severed from it. When this muscle is contracted, it is turned inwards, and so it turneth in the meat which hath escaped the teeth; and so when the meat is chewed it is kept inwardly by the tongue, and outwardly by this muscle, that it escape not from the teeth.

Now the muscles proper to the lips, are foure paire: First, *par assollens*, which beareth up the upper lip. This springeth from the first bone of the upper jaw: where the apple of the cheek is, there it is broad and fleshy: from thence marching obliquely to the forepart, it is inserted into both the sides of the lips neere to the nose. The second is *deprimens*, which pulleth downe the lower lip. It springeth from the sides of the chin,

The proper muscles.

1

2

3

4

chin, where two small bunchings are : there it is fleshy ; from thence marching obliquely, it is inserted into the middle of the lip : it is every where broad. The third paire is *abducens*, or drawing the lips to the sides. It ariseth fleshy and round from the hollownesse which is under the *maxilla*, and being lapped with much fat, it is inserted into those places, where both the lips are joyned together. The fourth is *corrugans*, or *constringens*, that paire which purseth the lips together. It is called also *osculatorium*, or the kissing paire, which draweth the lips together when we kisse. This paire is framed of a fungous fleshy substance, having orbicular fibres, as the *spincter* hath. The ends of both the lips are made up of these, which appeare red if we be in health, but pale if we be sickly.



## CAP. VII.

*Of the muscles of the lower jaw.*

THE lower jaw is moved upwards, downwards, towards the right side, towards the left side, and towards the back-part. To procure these motions five paires of muscles are appointed: The first is called the *temporale*. This doth spring from all the hollownesse of the bones of the Tempils, by a broad fleshy, and semicircular beginning, and by degrees becomming narrower; and being carried under the yoke bone, it is inserted into the proceffe of the lower jaw-bone by a strong tendon. This tendon is dispersed through the whole muscle. The *fibre* passe from the center to the circumference. This muscle is covered in its upper part with the *pericranium*; but in the lower part it is bare, and rested upon the bare *cranium*. Wherefore if this muscle

be

Why the  
wounds of  
the tem-  
poral mus-  
cle are  
dangerous

2

be wounded, fearefull symptomes ensue, partly because the tendon passeth through the whole muscle: partly because it is covered with the *pericranium*. This muscle forcibly pulleth up the lower-jaw, and so shutteth the mouth, and springeth from *os frontis, os principiis, temporum*, and the *sphenoides*. The second paire is called *deprimens digastricum*, or *biventre*, because it hath two bellies, between which a tendon lieth: this doth pull downe the jaw, and so openeth the mouth. It hath its beginning from the proecesses of the veines of the Tempill, called *Styloides*, where it is nervous and broad; and afterward becomming fleshy, small, and round, it passeth downeward, and is inserted into the inner-fore-part of the jaw-bone, which is under the chin, and somewhat rough. The third is called *masseter*, because it serveth for chewing by moving the jaw to the right and the left side: from its situation it may bee called *laterale*.

*lateralis*. This hath two beginnings : one is nervous, springing from the suture, where the first bone of the jaw is joyned to the fourth. This beginning is large and strong : the other beginning is fleshy, proceeding from the *os jugale*, and so marcheth towards the chin, and is implanted into the whole largenesse of the lower jaw strongly. The fibres of this muscle, by reason of the two beginnings crosse one another ; so that these muscles doe not onely move the jaw laterally, but backward and forwards also.

The fourth paire is called *pterygoideum externum*, *alisforme externum*, or *pterygoideum abducens*. This being in its beginning strong, and partly nervous, and partly fleshy, doth spring partly from the upper externall sides of the wing like processes, partly from the rough and sharp line of *incisive* : then marching by straight fibres, it becommeth greater. It is inserted by a strong tendon

5

tendon into the internall laterall part of the jaw, which is under the tendon of the temporall muscle. This moveth the jaw forward, which appeareth when the lower teeth are placed above the upper. The fifth paire is termed *maxillam adducens*, or *pterygoidesum internum*. This draweth the jaw towards the head, or backward. This, in the beginning being thicke and nervous, doth spring from the inner cavity of the wing-like processes; then becommeth fleshy, large, and thicke; marching by a straight passage, it is inserted into the lower jaw by a nervous, broad, and strong tendon, in the inner and hinder part of the jaw, about the cavity where the nerve entreth, where some asperities are found.

CAP.

CAP. VIII.

Of the muscles of the Eare.

THE eare is moved, though obscurely, foure manner of wayes : viz. upwards, downe-wards, forward, and backward. The muscles which move the eare are either outward or inward.

In the outside there are foure paire.

The first paire is called *attollens* : this is nothing but a portion of the frontall muscle, which is carried above the temporall muscle, and is inserted into the upper part of the eare : It is thin and membranous in the beginning, about the ending of the frontall muscle, and becomming narrower ; it goeth downe to be inserted into the upper part of the eare. The second is *deprimens*, or puller downe : This springing from the *musculus cutaneus* above the *parotides*, broad, fleshy, and sometimes fibrous ; and afterward becomming nar-

O

rower,

The outer muscles, foure paire,

The inward muscles two,

rower, is inserted by its tendon into the root of the cartilage of the eare. The third is *adducens ad interiora*, whereby the eare is drawne forward: This is but a partick of the *musculus quadratus*, which pulleth downe the cheekes. This ascending with its fibres, is implanted into the root of the ear. The fourth is *abducens ad posteriora*: this hath its beginning in the backe-part of the head, from the tunicles of the muscles of the nowle, above the *processus mammillaris*: being there but narrow, it is carried downewards transversely, and is inserted into the eare behind. In the inner part of the eare there are two, found out by *Aquapendente*, and *Julius Cosserrinus*. The first is called *externus*: it is small, springing from the skin and membrane which cover the passage of the eare; then becomming fleshy, marcheth by a short tendon to the outer part of the *synspernum*, and is inserted about the center of it, where within, the *malleus*

hammer

hammer is eyed to it. The second is called *internus* : this is small, and placed within the *os petrosum*. It hath its beginning in the *basis* of the wedge-bone ; then becoming somewhat fleshy, and after the midst of it narrower, it is divided into two small tendons ; whereof the one is inserted into the upper proceſſe of the *malleus*, and the other into the necke of it.

## CAP. IX.

*Of the muscles of the Tongue.*

THE tongue hath foure paires of muscles, by the which it is moved according to all the differences of moving by a wonderfull volubility. The first is *geneoglossus* : this pulleth the tongue without the teeth and lips. It springeth from the ruggednesse which is seene in the middle of the lower jaw, in the lower part of it, and is inserted into the roote of the

O 2      tongue.

tongue. The second is *Myloglossum*; this helpeth the former. This springeth from the inner part of the lower jaw, where the farthest grinding teeth are; and about the root of the tongue it is inserted into the ligament, by the which the tongue is tyed to the throat. The third is called *Hypsiloglossum*, or *retrahens*. This rising from the middle and upper part of the bone of the tongue fleshy, marching alongst the tongue, it is inserted into the middle of it. This draweth the tongue inward when it is contracted. The fourth is called *ceratoglossum*, or *Styloglossum*: by this it is drawne towards the sides. It ariseth from the *Styloides processus* of the bone of the tongue, by a fleshy, small, and sharpe point; then becomming broader, it is inserted into the sides of the tongue.



## CAP. X.

*Of the Muscles of the bone of  
the tongue.*

THIS bone is moved upwards, downwards, forward, backward, and toward the sides, as the tongue is ; because it is the foundation of the tongue : and the muscles of it serve for the motions of the tongue, and of the *larynx* also, when as the *larynx* and tongue are lifted up, and let down when we swallow. To performe the former actions, it hath foure paire of muscles. The first is called *Sternohyoidæum* : this springing from the upper, but inner part of the *sternum*, and marching by the wind-pipe, is inserted into the root of the *hyoides*. The second is opposite to this, and is called *geni-hyoidæum* : this springing from the inner part of the chin, fleshy, broad, and short, is inserted into the root of the bone, where a

cavity is to receive it. The third is *Coracohyoideum* : It riseth at the first small and long, but fleshy about the necke, and the Crowes bill-like proceſſe of the *scapula*; and paſſing under the *levator* of the ſhoulder-blade, called *musculus impatientia*, it is inſerted into the point of the *hyoides* : it hath two bellies, and is very long. The fourth is *ſtyloceratohyoideum* : This riſeth from the root of the *proceſſus ſtyloides*, and endeth in the points of the *hyoides*.

## CAP. XI.

## Of the muscles of the larynx.

The common muscles.

THE muscles of the *larynx* are either common, or proper. The common are foure; two called *branchii*, and as many called *hyothyroidai*. The *Hyothyroides* doth liſt up the *larynx*. This ſpringeth from the whole *basis*, almoſt of the bone of the tongue, and is im-

implanted into the externall middle part of the *thyroides*, or buckler-like cartilage. *Bronchium* pulseth downe the *larynx*: This springing from the inner part of the *sternum*, mounteth up to the basis of the *thyroides*, by the pipes of the *trachea arteria*. This muscle with its fellow raiseth up the length of the winde pipe in beasts and fowles, which have a long necke. The proper muscles are in number five. The first is *Cricothyroides anticus*: this dilateth it. This springeth from the fore and externall part of the ring-like cartilage, and is inserted into the laterall parts of the *Thyroides*. The third is *Cricothyroides lateralis*. It purseth together the *thyroides*. It springeth from the laterall part of the *cricoides*, and is inserted into the externall laterall parts of the *thyroides*. The third is *Cricovarytenoides posterior*: this openeth the ewar-like cartilage. This passeth from the backe part of the *cricoides* to the *varytenoides*. The fourth is *Thyroaryte-*

The proper muscles.

*arytenoides*, or *glottidens*: this helpeth the former, and springing from the inner and fore part of the *thyroides*, is inserted into the laterall parts of *arytenoides*. The fifth is *Arytenoides*: this is a round muscle, compassing the ewar-like cartilage.

## CAP. XII.

*Of the Muscles of the uvula  
and throat.*

THE *Uvula* hath two muscles to hold it up: for it is pulled downe by the weight of the meat as it passeth by it. The first is *Pterystaphilinus externus*: this springeth from the upper jaw, a little below the further most grinder, and is inserted into the side of the *uvula*. The second is *Pterystaphilinus internus*: this proceedeth from the lower part of the internall wing of the *pterygoides* processe, and is inserted into the *uvula* in like manner.

The

The throat, or the beginning of the *œsophagus*, called *pharynx*, hath seven muscles, to wit, three paires, and one without a paire. Of the paires, the first is *spheno-pharingeus*: this springeth from the sharpe point of the *sphenoides*, neere to the *styloides* procelle; and passing downeward, is inserted into the lateral parts of the throat, to pull up the mouth of the stomacke. The second is *Cephalopharingeus*. It springeth from that part where the head is joyned to the necke, and marching downe it is spread about the *pharynx*, and seemeth to make the membrane of it. The third is *stylopharingeus*: This springing from the *styloides* procelle, is laterally inserted into the *pharynx* to dilate it. That which hath no match is called *œsophageus*: this springing from one side of the *thyroides*, and circularly compassing the hinder part of the *pharynx*, it is tyed to both the sides of the *thyroides*, to contract the mouth of the sto-

make, as the *sphincter* doth the *anus*.

## CAP. XIII.

*Of the muscles of the head.*

The com-  
mon.

The pro-  
per.

THE muscles of the head are either common or proper. *The common* are those which together with the neck move the head: these are the muscles which move the necke. *The proper* are those which onely move the head when the necke remaineth immoveable: these are in number fourteene, or seven paire. First, two *mastoides* bend the head forward. These beginning in the upper part of the *sternum*, and the middle of the cannell-bone, are inserted into the proesse, called *mastoides*, obliquely. These are placed in the forepart: behind twelve or sixe paire are placed. The first is *splenicus*, or *triangularis*: this proceeding from the sixth *vertebra* of the breitt, and  
mar.

marching to the third *vertebra* of the neck, is inserted into the *occiput*. The second, *Complexus*, or *trigeminus*. This springing from the transverse processes of the same *vertebra*, is inserted into the *occiput*. The third, *recti majores*, two : these springing from the edge of the second spondill, are inserted into the *occiput*. The fourth, *recti minores*, two ; these lye under the former, proceeding from the back-part of the first spondill, end into the *occiput*. The fifth *obliqui majores* : these springing from the *spina* of the second *vertebra*, reach to the transverse proceſſe of the first *vertebra*. The sixth, *obliqui minores*, under ; these proceeding from the same beginning, are carried to the *occiput*. The oblique muscles turne about the head : the other muscles extend it.

CAP.

## CAP. XIV.

*Of the muscles of the Neck.*

THE neck hath eight muscles, foure on each side: for it is extended by two paire; *Semispinatum*, and *transversarium*. *Semispinatum*: this proceeding from the *spina* of the upper seven *vertebra* of the brest, and five of the *vertebra* of the necke, it is inserted into the edge of the second *vertebra* of the necke. *Transversarium*: This rising from the transverse processes of the sixe upper *vertebra* of the backe, is inserted outwardly into all the processes of the *vertebra* of the necke. It is bended by foure muscles, two on each side; to wit, first, *longus*: this being placed under the *æso-phagus*, doth spring from the third *vertebra* of the backe, and mounting up, it is tyed to all the *vertebra*, and endeth in the fore pro-  
 cessle of the first *vertebra*. The  
 third



third is *par spatium, triangulare, scalenum*. It proceeding from the first rib, is inserted into all the transverse fibres of the neck, by oblique fibres internally. It is perforate to make way for the veins, arteries, and nerves which passe to the arme.

C A P. XV.

Of the muscles of the Brest.

First of all, these dilate it. The first is *Subclavius*: this ariseth fleshy from the inner part of the *clavicula*, and is inserted into the first rib, neere to the *sternum*. The second is *serratus major*: this doth arise from the inside of the shoulder-blade, and the two upper ribs, and is inserted into the lower five true ribs, and two upper short ribs. The third is *serratus posticus superior*: this lying under the *rhomboides*, springeth from the edges of the three lower *vertebrae* of

The dilaters.

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of the necke, and from the edge of the first *vertebra* of the backe nervous, and is inserted into the three upper ribs. The fourth is, *serratus posterior inferior*: this ariseth from the edges of the three lower *vertebra* of the backe, and of the first *vertebra* of the loines, and is inserted into three or foure lower short ribs. Fifthly, *The eleven externall intercostals*, which perform the office but of one muscle. These spring from the lower part of the upper rib, and are inserted into the upper part of the lower rib obliquely, and forward.

5

The contracters.

I

2

These that follow contract the brest. First, the *triangularis*: this arising from the inward and lower part of the *sternum*, is inserted into the cartilages of the two upper ribs. This as a pillow receiveth the upper part of the heart. The second is *sacrolumbus*: this arising from the *os sacrum*, and the sharpe processes of the *vertebra* of the loines, endeth in the upper ribs, about

about their beginnings, bestowing upon each rib a tendinous latch. Thirdly, *the eleven internall intercostals*, which are as one muscle. These passe obliquely from the lower to the upper rib, filling the distance: their fibres are opposite to those of the externall, representing a Saint *Andrewes* Crosse. These serve for violent breathing, being seconded by the oblique muscles of the belly.

*Diaphragma*, or *septum transversum*, is the instrument of free motion. The head of it is in the center, but the taile in the circumference of the lower short ribs. For from the fourth short rib to the last, cleaving to the brims of them, it passeth by double or triple fleshy and tendinous productions to the twelfth *vertebra* of the back, and from thence to the third *vertebra* of the loines.

## CAP. XVI.

*Of the muscles of the Loines*

THE backe doth not move for want of muscles, and by reason of the ribs betweene the neck and loines, whilst the outward parts are moved. Onely the last spondill of the backe is moveable; for it doth not receive, but is received both above and under: but seeing it is annexed to the loines, the motion is rather to be ascribed to the loines than to the backe. *The loines* are bended by two muscles called *flexores*; there is one on each side. They spring from the hinder part of the edge or brim of the flank-bone, and inner laterall part of the *os sacrum*; and march by the transverse processes of the *vertebra* of the loines, fleshy to the last rib.

Benders  
two.

Extenders  
four

They are extended by foure muscles, whereof there are two in each side. These are so wrapped to-

ge

gether according to the length of the *spina*, that they may seeme either to be as many paires of muscles as are spondils, or one onely paire giving tendons to the *vertebra*. The first is *femispinatus*; this springeth by a nervous beginning from all the *spine* of the *vertebra* of the loines, and *os sacrum*, and ends in the transverse processes of the *vertebra* of the loines, and all those of the brest. The second is *sacer*; this ariseth by a sharpe and fleshy beginning from the hinder part of *os sacrum*, and is inserted into the roots of the *spina* of the spondils of the backe. If these four muscles conspire together, they keepe the *spina* immoveable: but if those of the one side doe onely move, it is drawn to one side.

**CAP.**

## CAP. XVII.

## Of the muscles of the Abdomen.

**I**T hath ten muscles; five on each side. The first is *obliquus descendens*: this being parted into seven or eight fleshy portions, whereof the three greatest are finger-like inserted into *serratus major*, it springeth from the lower side of the sixth, seventh, eighth, and ninth lower true ribs: then going downe obliquely, it cleaveth to the bended part of the outside of the *os ilium*, and to the edge of *os pubis*; then it endeth by a broad tendon in the *linea alba*. Wherefore it hath its beginning both above and below, but ending in *linea alba*. The second is *obliquus ascendens*: this ariseth from the sharpe point of *os pubis*, and from the top of the whole bending of *os ischium*, and cleaving to the four lowermost short ribs, by a double tendon, clipping the straight muscle,

muscle, it endeth in the *linea alba*. The fibres of this being opposite to those of the former, represent a Saint *Andrewes* Crosse. The third is *rectus*; this ariseth from the lower part of the *sternum*, about the *cartilago xyphoides*, fleshy; or rather from the cartilaginous ending of the ribs: and marching along the belly, it is inserted into the brim of the *os pubis*, by a thick and nervous tendon. It hath three intersections, which some account severall muscles; two are above the navel, and one even with the navel. If the fourth be found, it is placed under the navel. These intersections first strengthen the muscle, as knots doe reeds. Secondly, they further the extension of it in violent motions: so Tailors, to cause a cloath stockin to stretch and sit close, cut the cloth bias. The fourth is the *pyramidall*: this is placed above the lower part of the *musculus rectus*. It springeth from the *os pubis*. Most commonly there is found one in each

each side. Sometimes they are so united that they seeme one broad muscle; sometimes they are altogether wanting, and then the ending of this is fleshy, whereas otherwise it is tendinous. These strengthen the ends of the *musculi recti*. The fifth is the *transuersus*: this arising from the transverse processes of the *vertebra* of the loines, below it is tyed to the arch of the hanch-bone, but above to the inner part of the short ribs; and passing from thence to the *cartilago xyphoides* under the straight muscle, it endeth by a broad tendon in *linea alba*. This *linea alba* beginning at the *cartilago ensiformis*, passeth directly by the navell to the joyning of the *pubis*. It is framed of the membranous tendons of all the muscles of the belly, the straight excepted. But seeing the tendons of the muscles of the right side are so firmly united to the left, that no signe of separation can be discerned, it is not scene but betweene the two  
straight



Straight muscles. The muscles have their denomination from their situation, and the texture of their tendons. While the body is at rest, these strengthen the parts subjacent, and encrease their heat: in action, first, they further the excretion of the excrements: secondly, they helpe the delivery of the infant in labour: thirdly, they further strong breathing: fourthly, they bend the *spina* in violent exercises.

C A P. XVIII.

*Of the Muscles of the Genitals.*

**P***enis*, or the Pricke of Man, hath foure muscles, two on each side. The first is *erector*, or *director*: this ariseth from the inner knob of the hanch-bone, and being tyed by the side to the ligament of the pricke, it reacheth to the middle of it. The second is *accelerator*: this ariseth from the internall

internall knob of *ischium*, below the laterall ligament of the pricke, and from the *sphincter* of the *anus*, and being placed with his fellow under the *urethra*, passeth to the middle of the yard.

The *clitoris*, or little pricke in women, hath foure muscles. The two uppermost being round, they arise from the internal knob of the *ischium*, and being placed by the laterall ligaments, cause the erection of it. The two lower are broad and smooth, and proceeding from the *sphincter* of the *anus*, are inserted into the brims of the *cunnius*. —

The *stones* have two muscles to pull them up : they are called *cremasteres*, from *κρεμαίζω*, to hold up. In health they keepe the stones wrinckled, whereas in sickness they are flabby, and hang downe. They are thought to spring from the fore and inner brim of the *os ilium* : but they seeme rather to be the endings of the oblique ascending muscles neere to the *os pubis*; which

which compassing without the productions of the *peritonæum*, passe with the spermaticke vessels towards the stone. The Cremasters in women are shorter than in men, and are placed above the production of the *peritonæum*: through this production the round ligament of the *matrix* passeth, which in women is compassed with a fleshy substance, which resembleth the cremaster in men.

CAP. XIX.

*Of the muscles of the Bladder and Anus.*

THE bladder hath but one muscle, called *sphincter*, it doth compass round the necke of the bladder. Above it compasseth the *prostrates*, and is seated under them also. The fibres are orbicular. If one side be taken with the palse, an involuntary excretion of the urine doth not alwaies follow,

follow, because a nerve is implanted into each side of the neck of the bladder. In women it reacheth to the hole by the which the urine passeth, and it seemeth to forme it.

The *anus* hath three muscles. The first is *sphincter*: this is fleshy, and without the straight gut two inches broad. The fibres are orbicular. It doth not spring from any adjacent bone, but is onely inserted into the *coccyx*. The second and third are called *levatores*; they are placed within the gut, and are large and fleshy. They are tyed to the sides of the gut, and reach to the *sphincter*: they possesse the distance betweene the *ischium* and the *os sacrum*.

## C A P. XX.

*Of the muscles of the Shoulder-blade.*

THE shoulder-blade is moved forward, backward, upward,

upward and downward. It hath  
 foure proper muscles. The first is  
 called *trapezius*, or *cucullaris* : this  
 hath its beginning from the lower  
 part of the nowle-bone towards  
 the care, fleshy : but from the po-  
 sterior processes of the *vertebra* of  
 the necke, and the eight upper *ver-*  
*tebra* of the brest, it springeth mem-  
 branous and broad, and is inserted  
 into the *basis* of the *scapula*. The  
 second is *levator*, or *patientia mus-*  
*culus* : this hath its beginning from  
 the transverse processes of the first,  
 second, third, and fourth *vertebra*  
 of the necke, which beginnings  
 being united, are inserted into the  
 upper corner of the shoulder-  
 blade. The third is *serratus minor*  
*anticus* : this springeth from the  
 foure upper ribs before they be-  
 come cartilaginous : cleaving to  
 these be foure fleshy portions re-  
 presenting the teeth of a saw, and  
 are inserted by a broad tendon  
 neere to the anchor-like processe  
 of the *scapula*. The fourth is *rhom-*  
*boides* : this is placed immediately  
 P under

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under the *cucullaris*. This springeth fleshy from the hinder processes, or *spina* of three of the *vertebra* of the neck, and so many of the breast; and is inserted by as broad a fleshy ending, as the beginning was into the *basis* of the shoulder-blade. The fifth is *serratus major*: this hath its beginning from the eight upper ribs before they become gristly. The beginnings are fleshy portions like to the teeth of a saw, by which it is inserted into the like portions of the oblique descending muscle. Then it marcheth fleshy, by the ribs upwards at the sides of the breast, and is implanted by a large fleshy end into the whole inner *basis* of the *scapula*. It moveth the shoulder-blade forward and downward. The beginning must be in the breast where the fleshy portions are; because there the nerves are inserted: and that part is steady, which the *scapula* is not.

C A P. XXI.

Of the Muscles of the Arme.

**T**H E arme hath five motions, for it moveth backward, forward, upward, downward, and circularly. It is moved upward by two erectors, *deltoides* and *supraspinatus*. First, *deltoides* springeth from the middle of the cancell-bone, the top of the shoulder, and the whole *spina* of the *scapula*, and is inserted into the middle of the shoulder-bone. The second is *supraspinatus*, or *super scapularis superior*: this placed in the cavity above the *spina* of the shoulder-blade, and passing under the upper part of the *scapula*, is inserted into the necke of the shoulder-bone, which it compasseth with a broad tendon. It is pulled downe by *latissimus*, and *rotundus major*. *Latissimus*, so called from its largenesse; for with its mate it covereth the whole backe. It is called

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Depressors.

I

*ani scalptor, or terfor* ; for without these this office could not be performed. This springs by a broad membranous beginning from the hinder processes of the *vertebra* of the breast, . beginning at the sixth, and reaching to the middle of the *os sacrum*, and upper part of the *os ilium*: then passing upwards, when it is come to that part of the backe where the ribs bend, it becometh fleshy, and passeth by the lower corner of the *scapula* : where becomming narrow, it is inserted under the upper end of the shoulder-bone by a short broad tendon betwene the *musculus pectoralis*, and the *rotundus detrahens*. *Rotundus major*, or more properly, *teres major*, because it is long without edges, this springeth from the whole *costa* of the *scapula*, and is inserted into the shoulder-bone, a little below the necke of it.

Movers  
forward,

I

It is drawne forward by *pectoralis* and *coracoideus*. *Pectoralis* it beinneth from the seventh, sixth, and fifth true ribbes, the

*sternum*



*sternum*, and above the halfe of the cannell-bone, and by a sharpe tendon it is inserted into the shoul-der-bone, between the *deltoides* and the *biceps*. *Coracoides*, it beginneth at the *coracoides apophysis*, and endeth about the middle of the shoul-derbone.

It is moved backward by three : *infraspinatus*, or *subscapularis*, or *immersus*, and *rotundus minor* : *infraspinatus*, or *subscapularis*, it possesseth the whole cavity of the *scapula*. It springeth from the *basis* of it, fleshy, and so continuing, passeth forward ; but becomming stil narrower to the necke of the *scapula*, at the last it getteth a broad tendon by the which it is inserted into one of the ligaments of the arme. *Rotundus minor*, or *super-scapularis inferior* : this arising from the *basis* of the *scapula* by a fleshy beginning, marcheth forward ; and becomming narrower is inserted into the fourth ligament of the arme, by a broad and short tendon.

2

Pull. re  
backward.

Nota.

One thing is to be noted, that the tendon of *musculus latissimus*, together with the tendon of *musculus temporalis*, cause that cavity which is seene in the cavity of the arme-pit: for the tendon of the *latissimus* frameth the inside, but that of the *temporalis* the outside of the cavity.

## CAP. XXII.

## Of the Muscles of the Ulna.

Benders  
of ulna.

I

THE elbow hath two bones, *ulna* and *radius*. The *ulna* serveth for flexion, and extension; but the *radius* for pronation and supination. The *ulna* is bended by two, to wit, *biceps*, and *brachium internus*. *Biceps* hath two beginnings from the shoulder-blade. The first is that which is outward, tendinous and round; it springeth from the upper brim of the hollownesse of the *scapula*, and marcheth under the ligaments of the joint,

joynt, above the top of the shoulder by the chink in the bone made for that purpose, where it is wrapped by a ligament which riseth from the hollownesse. The second head is broader than the first, formed partly of a tendon, and partly of flesh; it springs from the anchor-like proceſſe of the shoulder-blade; then descending by the inner part of the top of the *scapula*, it meeteth with the former; below the head of the shoulder-bone, it becometh a strong fleshy muscle: afterward ending in a thicke, round, and strong tendon, it is inserted into the long knob, under the upper end of the *radius*. This is that tendon which causeth great paine if it be pricked in phlebotomy. *Brachiaſus internus* lying under the *biceps*, riſing from the middle of the shoulder-bone, unto which it cleaveth firmly: it is inserted both into the *ulna* and *radius*, where they meet.

The *ulna* is extended by foure muscles, *longus*, *brevis*, *brachiaſus*

Extenders

- 1 *externus*, and *cubitalis*. *Longus* ariseth from the lower brim of the *scapula* neer to the neck, where it hath a peculiar hollownesse; and endeth in the knob of the elbow. *Brevis* rising from the hinder part of the neck of the shoulder-bone, endeth in like manner in the *olecranon*; both these make but one strong tendon. *Brachius externus* placed under these two: it is placed upon the outside of the shoulder-bone: it is confounded with the other two, and endeth where they doe, but this seemeth to *Spigelius* (*de human. corp. fabricalib.* 4. c. 15.) to be but a fleshy portion, arising about the middle of the shoulder, and no peculiar muscle. *Cubitalis*, or *anconeus*: it is placed in the hinder part of the bending of the elbow, which is called *ἀγκών*, and answereth to the *musculus popliteus*: this ariseth from the lower and hinder part of the shoulder-bone; and placed betweene the *ulna* and the *radius*, it endeth by a nervoustendon in the
- 2
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- 4

the laterall part of the elbow an inch below the *olecranon*. The extending muscles have straight fibres.

CAP. XVIII.

Of the Muscles of the Radius.

THE *Radius* hath two sorts of muscles : for some are called *pronatores*, or pullers downe : some *supinatores*, or raisers up. The *pronatores* are two in number : the first is, *pronator superior rotundus* : this springeth from the root of the inner knob of the shoulder-bone, and from the inner side of the *ulna*, where it is joyned to the arm-bone; and endeth obliquely about the middle of the *Radius* by a membranous tendon. The second is *pronator inferior quadratus* : this is altogether fleshy. This springeth from the lower and inner part of the *ulna* two inches broad ; then marching obliquely above the ligament which joyneth the *radius*

The pronators.

1

2

to the *ulna*, it endeth in the inside of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or foure square.

Supina-  
tors.

I.

2

The *supinatores* are in like manner two. The first is *supinator longus*, so called, because of all the muscles which march by the *ulna*, it hath the longest belly. This springeth fleshy from the edge of the inner knob of the *ulna*; and marching obliquely under the *radius*, is implanted by a membranous tendon into the upper part of the lower *appendix* of the *radius*, bending somewhat to the inner side. The second is *supinator brevis*: this springeth from the outward part of the ligament of the lower end of the arme-bone, and from the hinder proccesse of the *ulna*; being without membranous, and within fleshy, it is inserted into the middle of the *radius*.

## CAP. XXIV.

## Of the Muscles of the Wrist.

THE Wrist is bended by two muscles in the inside. The first is *cubitus internus*: this doth arise by a fleshy and nervous beginning from the sharpe inner knob of the shoulder-bone; then passing fleshy by the length of the *ulna*, it doth end by a tendon, partly nervous, and partly fleshy, in the fourth bone of the first ranke in the Wrist. The second is *brachius internus*: this arising from the same place, and passing alongst the *radius*, is inserted into that bone of the backe of the hand which doth hold up the fore-finger.

Ben Jers.

I

2

Extenders

I

Two externall muscles stretch out the *carpus*. The first is *radius externus*, *five bicornis*: this ariseth from the sharpe edge of the outer knob of the shoulder-bone in the upper part of it, by a broad beginning: then becomming fleshy, it passeth

passeth to the middle of the *radius*, where it becommeth a strong tendon, which presently is divided into two tendons more broad than thicke. Both these passe a little asunder by the *radius* under the ligament, whereof one is inserted into the bone which stayeth the first finger, and the other into the bone which stayeth the middle finger. The second is *cubitani externus*: this hath its beginning from the root of the external knob of the shoulder-bone, in the upper end of it: when it is come to the wrist, it becommeth a strong round tendon, and is inserted into the upper part of that bone which stayeth the little finger, not farre from the wrist.

## CAP. XXV.

*Of the Muscles of the Palme of the Hand.*

**T**His is thought to have two muscles. The first is *palmaris*; this



this ariseth from the inner knob of the shoulder-bone round and nervous; and placed under all the muscles, it mounteth over the *ligamentum annulare*. Then it is dilated into a broad membrane, which cleaveth firmly to the skin of the palme of the hand, for firme apprehension, and quicknesse in feeling, and endeth about the first joynts of the fingers. The second is *caro quadam quadrata*, or a four-square fleshy substance: this springeth from the *membrana carnosa* under *mons luna*; where the eighth bone of the wrist is placed. From thence it is carried under the *musculus palmaris*, to the middle of the palme of the hand, and is inserted into the outside of that tendon which carrieth the little finger from the rest. This representeth two or three muscles, and serveth for the hollowing of the palme of the hand, to forme *Diogenes* his cup by, bringing the fleshy eminence under the little finger to the tenar.

## CAP. XXVI.

*Of the Muscles of the four fingers.*

Benders  
of the  
four fin-  
gers.

I

2

Exten-  
ders.

**T**HE fingers are bended, extended, and moved laterally. Now the muscles which performe these motions, either belong to the other fingers, or to the thumb. The fingers are bended by two muscles. The first is *sublimis*: this springeth from the inside of the inner knob of the shoulder-bone; and about the wrist it produceth foure tendons, which end about the second joynts of the fingers. These are hollow to give way by a chink to the tendons of the *profundus*. The second is *profundus*: this ariseth from the upper parts of the *ulna* and *radius* under the joint, and being separate into four tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *musculus sublimis*, under which they lye. The toes are extended by three muscles, whereof

whereof one is common, and two proper. The common is *extensor magnus*: this arising from the outer knob of the arme-bone, about the wrist, is divided into foure tendons, which end in the lowermost joynts of the fingers. The proper are two; the first is *indicator*, because it belongeth to the fore-finger. It ariseth from the outward and middle part of the *ulna*, and by a double tendon it endeth in the second joynt of the fore-finger: but one of the tendons becommeth one with the tendon of the *extensor magnus*. The second is *auricularis*, because it belongeth to the little finger. It ariseth from the upper part of the *radius*, and marching between the *ulna* and the *radius*, it is inserted outwardly by a double tendon into the little finger.

The fingers are laterally moved two manner of waies: for either they are brought to the thumb, or they are carried from it. These motions are performed by two sorts

Movers  
laterally.

*Interossei.*

sorts of muscles, called *interossei*, and *lumbricales*. The *interossei*, so called, because they are placed betweene the bones of the *metacarpium*: they are fleshy and round, and spring from the bones unto the which they are tyed: they passe straight alongt these bones: these when they are come to the roots of the fingers, they passe into tendons which cleave to the sides of the fingers, and end in the second joynt by their tendon. Six are placed betweene the threedistances, between the bones of the *metacarpium*, so that there are two betweene each distance: whereof one doth passe to the lower, one to the upper part of the tendon. The middle and ring finger receive two tendons, but the fore and little finger but one. The *lumbricales* are in number foure: these arise in the distances of the tendons by the wrist, and meet with the *interossei* about the first joynt of every finger. The first is inserted into the ring finger; the second & third

to the middle finger; but the fourth to the fore-finger: these are not one with the tendons of the *interossei*.

Abducing  
muscles,  
two.

Besides these muscles, the fore finger and the little finger have one *musculus abducens*. That of the fore finger springeth from the middle of the *ulna*: then neere the wrist it is parted into two tendons, which passe under the ligament. The upper is implanted at the root of the fore finger; but the lower into the root of the middle finger. That of the little finger, called *hypothenar*, is placed in the palme of the hand, under the little finger. It is short and strong; it springeth fleshy from the fourth bone of the *metacarpium*, and is implanted by a small nervous tendon into the outside of the first bone of the little finger.

CAP. XXVII.

*Of the Muscles of the Thumb.*

THE Thumb is extended by two muscles. The first is that which

Extenders.

I

2

which is called *longior*: this ariseth fleshy from the outer and higher seat of the *ulna*, where the rough line is; & the membranous, which tieth together the *ulna* and *radius*: from thence it is carried obliquely to the *radius*, and before it come to the *appendix* of it, it becommeth a round tendon, which passing under the annular ligament, marcheth according to the length of that side, which is next to the forefinger, and is inserted into the third bone of it. The second is *brevior*: this extendeth the second and third joynt of the thumb. It ariseth from the same line fleshy: it passeth obliquely above the *radius*. By one tendon it is implanted to the root of the first joynt of the thumb; by the other becomming membranous it cleaveth fast to the second and third bone of the thumb.

Benders.

1

It is bended by one muscle; which springing from the inner part of the *ulna*, is implanted into the first and second joynt of the thumb.

thumbe. This being fleshy, which *Spigelius de hum. corp. fabric. l. 4. c. 19.* divided into five muscles, together with the *abducent* of the thumb, makes up *monticulus luna*.

It is laterally moved by two muscles. The first is called *thenar*, or *abducens*: this springeth from the inner part of the bone of the wrist which stayeth the thumbe, by a nervous beginning: then becoming fleshy, it is inserted into the first joynt of the thumbe by a membranous tendon: this draweth it from the fore-finger. The second is *antithenar*, or *adducens*: this is seated outwardly, in the distance betweene the thumb and forefinger. This doth arise from the outer and hinder side of that bone which stayeth the first finger; and being fleshy is inserted into the whole inner side of the first joynt of the thumb: this draweth the thumb to the forefinger.

*Monticulus luna.*  
Movers  
laterally.

2

CAP.

## CAP. XXVIII.

*Of the Muscles of the Thigh.*Benders  
forward.

1

2

THE Thigh is bended forwards by three muscles. The first is *psoas*, or *ῥοα*, and *lumbaris*: this lieth in the inner part of the *abdomen*, upon the *vertebra* of the loines. It ariseth from the transverse processes of the two lowermost spondils of the backe, and marching by the inside of *os ilium*, it is inserted into the lesser *rotator*. The second is *iliacus internus*: this springing from the inside of *os ilium*, and being joyned to the *psoas* by his tendon, it endeth before betweene the greater and lesser *rotator*. The third is *pectineus*: this arising from the upper part of the *os pubis*, is implanted a little below the necke of the thigh bone.

Benders  
backward

1

It is bended backward by the three *glutii*, which make up the buttockes. The first is the outermost

most



most and the greatest : it springeth from the *coccyx* , from the edge of *os sacrum* , and from the halfe of the bending of *os ilii* , and is inserted foure inches below the great *rotator*. The second is the middlemost : this springeth from the outer part of *os ilium* , and is inserted into the outer side of the great *rotator*. The third is the lowermost ; this springeth a little lower , from the outer part of *os ilii* , and is implanted into the upper part of the great *rotator*. It is drawne to the inside by the *musculus triceps* : this is the biggest of all the muscles of the body , and hath three beginnings , which end in one musculous tendon. The first head doth proceed from the upper part of the share-bone , and lying by the *pectinens* , is inserted into the middle of the thigh-bone. The second springing from the middle of the same bone , being lesser , is inserted a little below the necke of the thigh-bone. The third arising from the lower part of the same

2

3

Drawers  
to the in-  
side.

I

same bone, being of all the lowermost and biggest, reacheth to the end of the thigh-bone by a very strong tendon. These are inserted into the hinder line which is in the bone, *Spigelius de hum. corp. fabric. l. 4. c. 22.* addeth another, which he termeth *lividus*: this proceedeth from the fore-part of *os pubis*, where the cartilage is, which joyneth the two bones by a broad and fleshy substance. As it descendeth obliquely it becometh a large tendon, but short; and marching downe by the inner part of the thigh, it is inserted into the middle of the thigh-bone.

Turners  
toward  
the out-  
side.

It is turned towards the outside by foure small muscles called *quadrigemi*. They are placed above the articulation of the thigh one by another. The first is called by others *Iliacus externus*, and from the figure *pyriformis*, it is longer than the rest; it ariseth from the lower and outer part of the *os sacrum*. The second ariseth from the

the knob of *os ischii*. The third  
ariseeth from the same part. These  
are inserted into the hollownesse  
of the great *rotator*. The fourth is  
called *quadrigenus quadratus*,  
more fleshy and broader than the  
rest : it lyeth two inches distant  
from the third : it ariseeth from the  
inner part of the knob of the *ischium*,  
and is implanted into the out-  
ward part of the great *rotator*. It  
is rowled oblique by two muscles  
called *obturatores*. The first is  
*obturator internus*, this rowleth it  
outward : this ariseeth from the  
inner circumference of the *os pubis*,  
and is inserted into the cavity  
of the great *rotator*. The second is  
*obturator externus* : this ariseeth  
from the externall circumference  
of the hole of the *os pubis*, and re-  
turning by the neck of the thigh-  
bone, as by a pulley, it endeth in  
the cavity of the great *rotator*, un-  
der the fourth *quadrigenus*.

3

4

Rowlers  
obliquely.

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## CAP. XXIX.

## Of the Muscles of the Leg.

Benders.

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THE shanke hath thirteene Muscles, whereof foure doe bend it. The first is *seminervosus*: this beginneth at the knob of the *ischium*, and endeth in the inner side of the *tibia*, towards the back side. The second is *semimembranosus*: it proceedeth from the same knob, partly nervous, and partly membranous; but it marcheth by a broad tendon to the inner and hinder part of the *tibia*. The third is *biceps*: this ariseth from the same knob of the *ischium*; and being carried by the outside of the *tibia* in man, about the middle of the thigh, it becommeth fleshy; and by one tendon it is inserted into the outside of the *tibia*. That this tendon may bee the more safely carried, the thigh-bone is griped and covered with a smooth and slippery ligament. The fourth is

postica

*posticus gracilis* : this ariseth from the line where the share-bone and hip-bone are joyned together, and marching downe in the inner side of the thigh, it is inserted into the inside of the *tibia*. In fat persons this seemeth to bee a stiffe sinew, when they stride much. The shanke is extended by five muscles. The first is *membranosus* : this proceeding from the upper part of the edge of the *ischium*, doth compasse both the thigh and the leg ; wherefore it is called *fascia lata*, because it covereth all the muscles of the thigh and leg, reaching to the foot. If it be nipt by sharpe humours, great paine is caused. The second is *longus* : this ariseth from the upper and fore-part of the edge of the bending of the *os ilium*, and passing by the inside of the thigh obliquely, it endeth in the inside of the leg : and because it is thought to bring in the leg, that it may be laid upon the other, some call it *sutorius*, the shoemaker's muscle : but it may

Extenders

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be

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be more truly called *sartorius*, the Tailors muscle; for when they sow upon their stals they sit cross-legged. The third is *rectus gracilis*; this springing from the lower brim of the *os ilium*, and passing straight alongst the length of the thigh, endeth in the *patella* by a broad tendon. The fourth is *vastus duplex*: these are placed at the sides of the *gracilis*, whereof the one is called *externus*; this springeth from the root of the greater *trochanter*, it endeth a little below the *patella*, outwardly. The other is called *internus*: this ariseth from the root of the lesser *trochanter*, and endeth in the inside of the leg, a little below the *rotula*. The fifth is *crureus*: this lieth under the two *vasti*; it springeth from the fore-part of the *os femoris*, betwene the two *trochanters*, endeth in the *rotula*. These four muscles, the *rectus*, *gracilis*, the two *vasti*, and the *crureus*, meeting about the knee, become one strong tendon, which covereth the *patella*.

On

One thing is to be noted, that the muscles which extend the leg are stronger than those which draw it in, that the weight of the body may be the better upholden when we stand. To these we may adde that muscle which is called *popliteus*, or *suppopliteus*, which moveth the leg obliquely: this lyeth in the hollow of the ham, above the head of the *solaus*: it springeth from the outer knob of the thigh-bone, and is inserted in the upper and hinder part of the leg, which it clippeth firmly.

7

C A P. XXX.

Of the Muscles of the Instep.

THE Instep is bended when it is drawne upwards. To performe this motion it hath two: the first is *tibians anterior*: this ariseth from the upper *epiphysis* of the *tibia*, neere to the *fibula*, and cleaving unto the whole *os tibia*, about the middle of it, it becom-

Benders.

I

Q 2 with

2

Extenders

I

meth a tendon, which passing under the annular ligament of the Instep, is divided in two tendons; whereof the one is inserted into the first of those bones which are called *innominata*, without a proper name; the other is inserted into the bone set before the thumb.

The second is *peroneus anterior*; this ariseth from the outer and middle part of the small focill, and being carried through the chinke of the outer ankle, it is inserted into the bone of the Instep, which stayeth the little toe: it hath two heads and two tendons. The foot is extended when it is drawne backwards. To performe this motion it hath two muscles. The first is *gemellus externus*, or *gastrocnemius externus*: this muscle hath two heads, that have seed-bones not far from their beginnings. The first head is under the ham, from the inner part of the end of the thigh-bone, where it is fleshy and broad, marching downe by the back and inner part of the *tibia*, when it is

come



come to the middle of it, it becometh tendinous, and is joyned with the tendon of *gemellus internus*. The other head likewise ariseth under the ham, but from the outer part of the end of the thigh-bone. It passing downe by the outward and back-part of the leg, becometh tendinous a little above the tendon of the former; then being joyned to the former, they become one strong, broad, and sinewy tendon, which is inserted into the heele. The second is *gemellus internus*, or *gastrocnemius internus*: this lieth under the former, and is of a livid colour. It springeth from the *appendix* of the lesser foci by a strong nervous substance: it doth become thicker, but when it hath passed the middle of the *tibia* it becometh narrower, and tendinous; and a little above the heele it is so united to the tendon of the former *gemellus*, that both seeme to bee but one, and is inserted into the heele. By this tendon Butchers hang up the

Movers  
obliquely:

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beasts killed. The Instep is moved obliquely by two. The first is *tibians posticus adducens pedem*, or *nautilus*, because Sailers use it much when they goe up by the ropes. It springeth both from the greater and lesser focill, and from the ligament which tyeth these together; it being tyed to this tendon, lyeth amongst the hinder muscles, and neere to the inner ankle it becommeth tendinous: then passing by it, it goeth to the soale of the foot, and is inserted into the lower part of the bone which is next to the *cubiforme*. The second is *peroneus vel fibularis posticus*: this ariseth from the upper, but hinder part of the small focill, by a nervous and strong beginning; and cleaving to the outside of the perone, it passeth down round and fleshy: the outer part is of a livid colour, but the inner of a red. When it is come to the middle of the focill it becommeth tendinous, which behind under the outward ankle, obliquely marching,

marching, is inserted under the soale of the foot into the bone set before the great toe. To these may be added that muscle which is called *plantaris*, because it covereth the whole soale of the foot. It lyeth under the *gemellus externus*, and springing from the outerpart of the end of the thigh-bone, under the ham, by a round fleshy beginning; then passing within the leg, between the two *gemelli*, and from thence to the soale of the foot, it covereth all the toes about the first joynt, and is inserted into all the toes. It answers *palmaris*.

*Plantaris  
musculus.*

C A P. XXXI.

*Of the Muscles of the Toes.*

THE toes are extended by two. The first is *longus*; it doth arise by a nervous and sharpe beginning from the fore *appendix* of the great focill, and cleaving to the ligament which uniteth the two focils, it goeth downe to the

Extenders  
I

Q 4

foot.

2

Benders.

I

foot. First, it passeth under the transverse ligament; then it being divided into foure tendons, they are inserted into the third and second joynt of the foure toes to extend them. The second is *brevis*; this lyeth under the former: this hath its beginning from the transverse ligament, fleshy and broad, and by its foure tendons it is inserted into the first joynts of the four toes. The benders of the toes are in like manner two. The first is *longus*, or *perforans*: it lieth under the *gemellus internus*, and ariseth from the hinder part of the *tibia*, under the ham by a long and a fleshy beginning; and passing according to the length of the *tibia* unto the which it cleaveth, when it hath the middle of it, it becometh tendinous: then under the inner ankle, and the ligament which reacheth from the lower *appendix* of the *tibia*, it goeth by a hollownesse of the heele to the soale of the foot; where being divided into foure tendons, it passeth through

through the holes of the *flexor brevis*, and is inserted into the third and last joynt of the foure fingers. The second is *brevis*, or *perforatus*: this springeth from the inner part of the heele-bone, and when it hath passed the middle of the foot, it is parted into foure round tendons, which are inserted into the second joynts of the foure toes, being perforate to give way to the tendons of the former muscle to passe to the third joynt. Thirdly, *lumbricales*, foure: these spring from the tendons of the *perforans*, small and round, and are inserted by a small tendon into the side of the first joynt, which they helpe to bend. The fleshy substance, which filleth up the cavity of the first joynts of the foure fingers, seemeth much to further the action of these muscles: for springing by two sharpe beginnings from the lower part of the heele-bone, it is inserted into the beginnings of the foure *lumbricales*.

2

*Lumbricales, 1.*

The *interossei* are placed betweene the bones of the instep. These *interossei*, so called, because they are placed between the bones, in the foot, are ten in number; whereas there are but eight in the hand, because the instep hath one bone more in the wrist. Each of them doth spring from the side of the bone of the instep where it is placed; and all marching according to the length of the bone fleshy, they are inserted into the roots of the fingers by short tendons, and somewhat broad. If the inner be drawne together, the finger is brought in; but if the outer be moved, the finger is carried from the rest. Betweene the foure distances between the bones, there are eight such muscles, at the outside of the thumb one, and one other at the outside of the little finger. Besides these you may observe a small transverse muscle, which passeth from the thumb over the first joynts of the fingers to the little finger. It seemeth to have

The trans-  
vers mus-  
cle.

The in-  
vention of  
this is at-  
tributed to  
*Casseri*  
by *Bartoli-*  
*nus*. l. 4. c.

14.

have a twofold use : first, to tye together the bones of the first joynts of the toes. Secondly, to save their tendons from harme when we tread upon hard things.

The great toe hath peculiar muscles. The first is *extensor* : this springeth by a fleshy beginning from the outside of the great foscill, where it parteth from the *fibula*. It cleaveth fast to the ligament, which ties the *tibia* to the *fibula*, and marching alongst the upper part of the foot, it is inserted into the whole upper part of the thumbe. The second is *flexor* : this springeth from the backe part of the *fibula*, about the middle of it fleshy and pointed : then becoming thicker, about the inner ankle it becommeth tendinous and is inserted into the last joynt of the thumb: before it come to the second joint it hath a larger seed-like bone than the joynts of the rest of the fingers have. The third is *adducens pollicem*, which draweth the great toe from the rest, to the inner part of

Extenders  
of the  
great toe.

1

2

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4.

of the foot. It springeth nervous from the ligament which tyeth together the heele bone, and the *talus*, it cleaveth to the bone set before the thumb, and is inserted by a round tendon into the outside of the first joynt of the great toe. The last is *abductor minimi digiti*: this being placed in the outside of the foot it proceedeth from the outer part of the heele bone, where the knob is nervous: but becomming fleshy, and being tyed to the bone of the *metatarsus*, which stayeth the little toe, it is inserted by a round tendon into the outside of the first joynt of the little toe.

The





The number of the Muscles  
of each part.

<b>T</b> HE eye-lid hath	4
The occipitals on each side	1
Each eye hath	6
The nose hath	6

These are in num-  
ber 17.

Both the lips have	10
The lower jaw hath	10
The ear hath	10
The tongue hath	8
The bone the of tongue hath	8
The <i>larynx</i> hath	10
The <i>uvula</i> hath	2
The <i>pharynx</i> hath	7

These are in num-  
ber 65.

The head hath	14
The necke hath	8
The brest hath	30
The	

The loines have	6
The <i>abdomen</i> hath	10
The pricke hath	4
The <i>clitoris</i> hath	4
The stones have	1
The bladder hath	1
The <i>anns</i> hath	3

These are in number 81.

The shoulder-blade hath	3
The shoulder hath	8
The <i>ulna</i> hath	6
The <i>radius</i> hath	4
The wrist hath	4
The palme of the hand hath	2
The foure finger shave	19
The thumbe hath	5

These are in number 53.

The thigh hath	11
The shanke hath	13
The instep hath	7
The toes have	23

These are in number 54.

The totall summe of all the muscles of the body of man 270.



AN  
ENUMERATION  
OF ALL THE  
MUSCLES  
OF THE WHOLE  
BODIE.

Each eye hath one frontall to lift it up: the first is called *orbicularis major*, under the frontall; and two called *ciliares*, one in each eye-lid to shut it.

The occipitalls which meet these, are two, one on each side.

As for the *ear*, in the outside there are foure paire: first, *par attollens*, lifting it up: secondly, *par deprimens*, pulling it down: thirdly, *par adducens*, which moveth it forward: fourthly, *par abducens*, which pulleth it backward. In the inside there are two, *externus*, the exter-

The muscles of the eye-lids foure in each.

The muscles of the eares. 10.

The muscles of the eye, 6.

externall; and *internus*; the internall.

The eye hath six muscles, foure straight, and two oblique.

The first of the straight is called *attollens*, or *superbus*.

The second is *deprimens*, or *humilis*.

The third *Adducens*, or *bibitorius*.

The fourth *Abducens*, or *indignatorius*.

The oblique are two:

1. *Obliquus major*, seu *superior*.

2. *Obliquus minor*, seu *inferior*.

The muscles of the nose, 6.

The nose hath sixe muscles.

*Erectores*, or pullers upward, two.

*Dilatatores*, or openers, two.

*Constrictores*, or pullers together two, one in each side.

The muscles of the lips, 10.

The lips have two common muscles, and foure proper:

Of the common, the first is called *zygomaticus*, the second *bucco*.

Each lip hath foure proper:

1. *Attollens*, which beareth up the upper lip.

2. *Depri-*

2. *Deprimens*, which beareth the lower lip downewards.

3. *Orbicularis*, or *sphincter*, which maketh up the fungous substance of the lips.

4. *Abducens*, or drawing aside.

The lower jaw is moved upwards by three muscles: the *temporalis*, the *pterygoideus internus*, and the *masseter*.

The muscles of the lower-jaw, 10.

It is pulled downe by *digastricus*, and *musculus latus*.

It is pulled forward by *pterygoideus externus*.

The tongue hath eight muscles, foure on each side.

The muscles of the tongue, 8.

1. *Genioglossus*, which draweth it forwards.

2. *Myloglossus*, it helpeth the thrusting of it out.

3. *Basiglossus*, or *hypsiglossus*, by the which it is pulled backwards.

4. *Styloglossus*, or *ceratoglossus*, by the which it is moved to the sides.

The *os hyoides* hath foure muscles on each side.

1. *Ster-*

The muscles of the bone of the tongue. 4.  
The muscles of the larynx 9.

1. *Sternohyoides.*
2. *Genihyoides.*
3. *Coracoides.*
4. *Styloceratoides.*

The *larynx* hath foure common muscles, and five proper.

Of the common there are,

1. Two *hyothyroides*, which pull up the *larynx*.
2. Two *Bronchii*, which pull it downe.

Of the proper,

1. *Cricothyroides anticus.*
2. *Cricothyroides lateralis.*
3. *Cricoarytenoides posticus.*
4. *Thyroarytenoides*, five *glottens*.
5. *Arytenoides.*

The muscles of the pharynx. 7.

The *pharynx*, or beginning of the *oesophagus* hath seven muscles, three paires, and one without a match.

Of the paires,

1. *Shemopharingeus.*
2. *Cephalopharingeus.*
3. *Staphylopharingeus.*

That which hath no match is called *oesophagus*.

The

The *gargareon* hath two Muscles.

1. *Pterystaphilinus externus*, this holdeth it up.

2. *Pterystaphilinus internus*, this doth the same.

The head hath two sorts of muscles: for some are common, and some are proper: the common, which together with the necke move the head; and these are the muscles of the neck.

The proper are those which onely move the head, when the necke remaineth immoveable: and these are in number fourteene. It is pulled forward by the two *mastoides*: these are placed before; these bend it forward. Behind twelve are placed.

1. *Splenius, vel triangularis*.

2. *Complexus, vel trigeminus*.

3. *Recti majores*, two.

4. *Recti minores*, two; these stretch out the head.

5. *Obliqui majores, five superiores*, two.

6. *Obliqui minores, five inferiores*,

The muscles of the *uvula*. 2.

The muscles of the head. 4.

Proper muscles.  
14.

The muscles of the necke, 8.

*feriores*, two : these winde the head about.

The necke hath foure on each side.

It is bended by two paires,

1. *Par longum.*

2. *Par spinatum, triangulare, scalenum.*

It is extended by two paires,

1. *Semispinatum.*

2. *Transversarium.*

Seeing 64. muscles serve for one side of the head and necke, there must bee 128. for both the sides.

The trunk of the body hath 46 muscles for one side.

The muscles of the breast.

As for the breast, first, these dilate it :

1. *Subclavius.*

2. *Serratus major.*

3. *Serratus posticus superior.*

4. *Serratus posticus inferior.*

5. *Intercostales externi*, fifteene in number, which are as one muscle.

The breast is contracted by fifteene in number.

1. *Sacro.*



1. *Sacro-lumbus*.

2. *Semispinatus*, or *triangularis*.

3. The internall intercostals, in number thirteene.

*Diaphragma*.

Double this number, and you shall have 32.

The loynes are bended by the *triangulares*, one on each side.

They are extended by foure, two on each side.

1. *Semispinatus*.

2. *Sacer*: two of them on each side.

The *abdomen* hath five on each side.

1. *Obliquus ascendens*.

2. *Obliquus descendens*.

3. *Rectus*.

4. *Transversalis*.

5. *Pyramidalis*.

The stones have two cremasters to elevate them.

The prick hath two on each side.

1. *Erector*, or *Collateralis*.

2. *Ac-*

The muscles of the loines.

The muscles of the belly, 10.

The muscles of the stones, 2.  
The muscles of the prick, 4.

The muscle of the bladder, 1.  
The muscles of the *anus*, 3.

The muscles of the arm.  
The muscles of the shoulder-blade, five on each side.

The muscles of the shoulder.  
8.

2. *Accelerator*, or interior.

The bladder hath one, the *sphincter*.

The *anus* hath three muscles: one to purse it in, called *sphincter*; and two to pull it up, called *levator*.

Double this number, and you shall have 92.

The arm hath 44. muscles.

The shoulder-blade hath 5. muscles on each side.

1. *Trapezins*, for sundry motions.

2. The proper *levator*, or lifter up.

3. *Rhomboides* which draweth it backwards.

4. *Serratus minor anticus*, drawing it forewards.

5. *Serratus major*.

The *brachium* or shoulder hath eight.

1. *Deltoides*. } moving it  
2. *Supraspinatus*. } upward.

3. *Latissimus*. } drawing it  
4. *Rotundus major*. } downward

5. *Pe-*

5. *Pectoralis*. } pulling it for-  
6. *Coracoides*. } ward.

7. *Rotundus minor*. } pulling it  
8. *Immersus*, or *infra-spinatus*. } backward.

The *elbow* hath ten muscles.  
The *ulna* hath six.

The mus-  
cles of the  
*ulna*, 6.

1. *Biceps*.  
2. *Brachialis internus*. } bend it.

3. *Longus*.  
4. *Brevis*.  
5. *Brachialis externus*. } extend  
6. *Angonans*. } it.

The *radius* hath four.

The mus-  
cles of the  
*radius*, 4.

1. *Pronator rotundus superior*.  
2. *Pronator inferior quadratus*.  
3. *Supinator longus*.  
4. *Supinator brevis*.

The *carpus*, or *wrist*, hath four  
muscles.

The mus-  
cles of the  
*wrist*, 4.

1. *Cubitus internus*. } these  
2. *Brachialis internus*. } bend it.  
3. *Ra-*

The muscles of the fingers, 18 in each hand.

3. *Radialis externus, sive bicornis.*  
 4. *Cubitalis externus.* } these extend it.

The fingers have eighteen muscles.

1. *Sublimis.* } by these they  
 2. *Profundus.* } are bended.

3. *Communis extensor magnus.*  
 4. Proper to the fore-finger or indicator. } these extend the  
 5. Proper to the little finger, or *auricularis.* } fingers.

6. *Interossei.*  
 7. *Lumbricales, 4.* } these partly part them, partly draw them together.

8. *Abductor digiti parvi.*  
 9. *Adductor indicis, sive indicator.*

The muscles of the thumb, 6.

The thumb hath six muscles.

1. *Longus*

1. *Longus.*  
2. *Brevis.* } these extend it.

3. One it hath to bend it.

4. *Thenar* bendeth it forwards.

5. *Antithenar* bendeth it backwards.

Double the number of 42. the number of the muscles of one arm, and you shall finde 84. muscles of them both.

The thigh hath ten muscels.

The muscles of the thigh, 10.

1. *Psoas.*  
2. *Iliacus.*  
3. *Pectineus.* } these bend it forward.

4. *Glutius maximus.*  
5. *Glutius medius.*  
6. *Glutius minimus.* } these bend it backwards.

7. *Quadriceps*, or *quadrigemi*, 4 } these bend the thigh small muscles. } outward.

8. *Triceps*, this bendeth it inwards.

R

9 Ob-

The mus-  
cles of the  
leg, Of the  
tibia, 11.

9. *Obturator internus*, this row-  
leth it outwards.

10. *Obturator externus*, this  
rowleth it inwards.

Double the number 10. and  
you shall have 20. muscles for  
both thighs.

The leg hath 42. muscles.

The tibia hath 11.

1. *Seminervosus*.

2. *Semimembranosus*.

3. *Gracilis internus*,

*seu posticus*.

4. *Biceps*.

} these  
bend it.

5. *Membranosus*, *seu*  
*fascia lata*.

6. *Sutorius*, five lon-  
gus.

7. *Vastus externus*.

8. *Vastus internus*.

9. *Rectus gracilis*.

10. *Cruentus*.

} these ex-  
tend it.

The mus-  
cles of the  
feet, 9.

11. *Suppopliteus*, or *popliteus*, this  
moveth it obliquely.

The instep hath eight muscles.

1. *Tibialis*

1. *Tibialis anterior.* } these bend  
2. *Peronaeus anterior,* } it.

3. *Gemelli duo,* or the }  
twins. } these ex-  
4. *Plantaris.* } tend it.  
5. *Soleus.* }

6. *Tibialis posterior.* } these move  
7. *Peronaeus posterior.* } it oblique-  
8. *Plantaris.* } ly.

The toes have eighteen muscles.

1. *Longus.* } these bend them.  
2. *Brevis.* }  
3. *Sublimis.* } these extend them  
4. *Profundus.* }  
5. *Interossei* eight; these bring  
them together and sever them.

The mus-  
cles of the  
toes, 23.

6. *Lumbricales* four. }  
7. *Caro musculosa,* or } these  
the muscularous flesh. } draw  
8. *Transversalis.* } them to-  
9. The drawer in of } gether.  
the little toe. }

The mus-  
cles of the  
great toe,  
4.

The great toe hath four muscles.

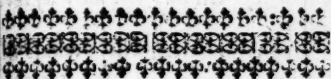
R 2

I. Ex-

1. *Extensor*, or extender.
2. *Flexor*, the bender.
3. *Adducens*, that which draweth it to the rest.
4. *Abductor minimi digiti*, that which draws the little finger from the rest.

Double the number of 42 expressing the number of the muscles serving for one leg, and you shall have the number of 84. which is the number of the muscles of both the legs.





# The Explication of some Appellations of the Muscles, and some other parts of the BODIE.

**A**ncyroides, *anchor-like.*  
Ancon, *the bending of the elbow.*

Acromium, *the upper part of the shoulder-blade.*

Arytenoidæus, *because it beginneth & endeth in the ewar-like cartilage.*

Bronchus, *the lower-part of the winde-pipe.*

Biceps, *because it hath two heads.*

Ceratoglossus, *because it ariseth from the points of the bone of the tongue, & is inserted into the tongue.*

Coracohyoidæus, *because it springeth from the processe of the shoulder-blade like the crows bill,*

and is inserted into the bone of the tongue.

Cephalopharingæus, because it beginneth where the head is joynd to the neck by the first vertebra, and is inserted into the pharynx.

Crycothyroidæus, because it springeth from the ring-like cartilage, and is inserted into the thyroids.

Crycoarytenoidæus, because it beginneth at the ring-like, and endeth at the ewar-like cartilage.

Corone is the procèsse of the lower jaw.

Coracoides, like the crows bill.

Cremaster, it holds up the stone.

Deltoides, because it is like to the Greeke letter  $\Delta$ .

Gencoglossus, because it hath its beginning from the chin, and is inserted into the bone of the tongue.

Gluteus, because it maketh up the buttockes.

Gastrocnemius, because it maketh up the calfe of the leg.

Hypiloglossus, because it hath its beginning from the bone of the tongue,

tongue, & is inserted into the tongue.

Hyothyroidæus, because it springeth from the bone of the tongue, and is inserted into the buckler-like cartilage.

Larynx is the beginning of the winds-pipe, derived from λαρυγγίζειν, which is to shout with an open mouth. It is framed of foure cartilages: the first is Thyroides, buckler-like: the second and third is Arytenoides, ear-like: the fourth is Cricoides, ring-like.

Myloglossus, because it hath its beginning at the root of the grinders of the lower jaw, and is inserted into the tongue.

Mastoidæus, because it is inserted into the dug-like proësse of the temple.

Masseter, because it serves for eating.

Pharynx is the throat. Psoa, because it is clipped in embracing.

Rhomboides, because it is like the mathematicall figure called rhombus, having foure lines, but not the foure sides equall.

*Sternohyoidæus*, because it hath its beginning from the Sternum, and is inserted into the bone of the tongue.

*Styloceratomyoidæus*, because it springeth from the bodkin-like pro-  
cesse, and is inserted into the point of the bone of the tongue.

*Sphænopharinæus*, because it springeth from the wedge-bone, and is inserted into the pharynx.

*Stylopharinæus*, because it beginneth at the bodkin-like pro-  
cesse, and is inserted into the pharynx.

*Styloides*, because it representeth the pin of a Table-booke, or a needle.

*Sternohyoidæus*, because it beginneth at the Sternum, and is inserted into the bone of the tongue.

*Spinatus*, which is placed by the sharp brim of a bone.

*Sigmoides*, which is like to the Greeke Σ.

*Sphænoides*, the wedge-like bone.

*Sphincter*, the drawer together.

*Thyroa.*

Thyrocartilagenus, because it  
beginneth at the buckler-like car-  
tilage, and endeth in the ewar-  
like.

Trigeminus, which hath three  
beginnings.

Trapezius, because it hath foure  
sides bounded with unequall lines:  
for the Geometers so call such a  
figure.

R 5

The

The explication of the fourth  
Figure.

1. The bones of the head. 2. The  
bones of the chain of the back. 3. The  
shoulder-blade. 4. The ribs. 5. The  
os sacrum. 6. The thigh-bone.  
7. The bones of the knee. 8. The  
bones of the legs. 9. The bones of  
the feet.

THE

Fig. IV.



*Fig. v.*





The explication of the fifth  
Figure.

1. *The shoulder bone.* 2. *The elbow-bones.* 3. *The bones of the hand.* 4. *The bones of the back.* 5. *The heel-bone.*

These two figures are to be placed  
in their order immediately be-  
fore the first Chapter of the  
book of bones.

THE



THE FOVRTH  
**B O O K E**  
 Of the BONES.

C A P. I.

*Of the nature of a Bone.*

**T**O the perfecting of a bone  
 foure causes concur:  
 First, The efficient cause;  
 which is the ossifick faculty of the  
 spirit, unto which the naturall  
 heat ministreth. Secondly, The  
 materiall cause; which is twofold:  
 The one is of the generation, the  
 other of the nutrition of the bone.  
 The matter of generation is the  
 thickest

thickest part of the seed : The matter of nutrition is blood , with which all parts of the body are nourished ; and not the marrow. For first, small bones have no marrow. Secondly, the marrow is hot and moist , but the bones cold and dry. The veins and arteries, which carry this nutrimentall blood , are placed in the ends of the bones , as in the scull, thigh-bone , and the great focill of the legge. The marrow serveth for the moistening of the bones, which are dry and still in motion. No nerves passe to the bones ; for they onely feel by the benefit of the *periostium*. Thirdly, the formall cause is twofold : by the essentiall it is cold and dry ; the accidentall is the figure, which for the most part is either round or flat. Fourthly, the finall cause is double : the generall , which serveth the whole body ; and it is threefold : First, they establish the soft parts : Secondly, they give figure to the parts : Thirdly , they further the motion of the body.

The

*Lib. de esset.  
ad Tyron.*

The speciall is that which is proper to every particular bone. Of the premises such a description of a bone may be gathered: *A bone is a similiary part, most dry and cold, inflexible, compacted of the thickest part of the seed by the spirit, the naturall heat concurring, to afford stablesse and figure to the whole body.*

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CAP. II.

*Of the naturall affections of Bones.*

THESE affections are either common to all bones, or proper to some only.

The common are nine: For first, a bone must be hard, the better to stay the body: Secondly, without it must be slippery, for ready motion: Thirdly, it must be white, because it is a spermatick part and nourished by blood. Fourthly, it must be destitute of feeling, for avoiding of pain in motion.

motion. Fifthly, it must be either hollow or spongi-ous, to contain a marrowy substance, for moistning of them. Sixthly, it must be tipped in the ends with a cartilage, and be bedewed with an unctuous humour, to procure an easie motion. Seventhly, that it be covered with a membrane, to preserve it from cariosity, except the three bones of the eare, and the parts of the teeth above the gummes. Eighthly, that about the ends it have holes, to admit veins and arteries for nourishment. Ninthly, that it be equall. Wherefore the *callus* wherewith a broken bone is united, and nodes in the pox, are not naturall affections. By these you may pronounce a bone to be ill affected: First, if it be soft; because it must cause the member to be too flexible. Secondly, if it be dry; for then it is distempered. Thirdly, if it be white; for then it is dead. Fourthly, if it be black; for then it is carious. Fifthly, if its figure be altered;

tered; for then it must hinder the action of the part.

The proper affections are four: The first is a cavity; and it is two-fold: for it is either deep, and it is called *cotyle*; or shallow, and it is called *glene*. The second is a bunching out; and it is either harder than the rest of the bone, and it is called *apophysis*; or it is softer, and it is called *epiphysis*. If the bunching out be round, it is called *caput*; under it is the *cervix*, as in the upper end of the thigh-bone: If it be flat, it is called *condylus*; if pointed, *corone*. Other protuberancies are named from the similitude they have from other things; as *styloides*, bodkin-like; *coracioides*, crow-like, &c. The third is inequality: this is seen in the nowl for the insertion of muscles. The fourth is smoothnesse, as the rest of the skull.

## CAP. III.

*Of the differences of the joyning of bones together.*

**T**hey are coupled together either by joyning or growing together. Jointing is either for manifest or obscure motion. The jointings which ierve for manifest motion are three. First, *Enarthrosis*, and it is when a large head of a bone is received in a deep cavity, as the thigh-bone in the hip bone. Secondly, *Arthrodia*; it is when the cavity which receiveth is shallow, and the head of the bone which is received shallow: such is the articulation of the lower jaw with the temple-bone. The third is *Gynglymos*; when the same bone receiveth, and is received. This falleth out three manner of wayes; first, when the bone is received by another, and receiveth the same; this is seen in the articulation of the shoulder-bone with the elbow-

bow-bone. Secondly, when a bone receiveth one bone, and is received by another: this may be seen in the spondils of the back, where the middle bone receiveth the upper, and is received by the lower. The third is, when the proceffe of the bone being long and round, is inserted into another upper bone, and so is turned in the cavity as if it were in an axle-tree; so is the second *vertebra* of the neck with the first.

Articulation for obscure motion may be observed in the articulation of the ribs with the spondils, and in the bones of the wrist and ankle.

Bones grow together either without some middle substance, or with it: Without some middle substance they are coupled three manner of wayes. First, by a line, as the bones of the upper jaw and nose are coupled: this is called *harmonia*. Secondly, by a suture, as the bones of the scull are united. Thirdly, when one bone is fastened



ned in another, as a nail in wood ; and so are the teeth fastened in the gums : this is called *gomphosis*. If bones grow together by a middle substance , it is either by a cartilage ; and so are the share-bones joyned : this union is called *synchondrosis* : or by a ligament , and so the thigh is joyned with the hip-bone : this is called *synneurosis* . Or last of all , by flesh , and so is the bone of the tongue to the shoul-der ; this is termed *syssarcosis*.

The uses of the coupling of bones are these. First, for motion. Secondly, for perspiration , as in the sutures of the head. Thirdly, to give way to the passing of some substance, as the same sutures to give way to the *dura mater* to make the *pericranium*. Fourthly, for securities sake , as one may see in a member where many bones are. Fifthly, to put a difference between parts , as we perceive in the bones of the upper jaw.

## CAP. IV.

*Of the Sutures of the head.*

**T**He bones of the whole body belong to these foure parts of it ; the head, necke, the brest, the lower belly , and the lims. The head is that part which is above the *vertebra* of the necke : of it there are two parts, the skull, and the jaw-bones. The skull is that bony substance which containeth the brain, and is decked with haire. In the description of the bones of the head these two things are to be noted ; the sutures, and the number of the bones. The sutures are either proper , or common : the proper are those which joyne the bones of the skul one with another ; and they are either true sutures, or counterfeit. The true are those which represent two combs joined together by their teeth, these are three in number : the first is *coronalis*: It is seated in the fore-part, and

and passeth from one tempil to the other transversly. The second is *lambdoides*, opposite to this, resembling the Greek letter  $\Lambda$ . The third is *Sagittalis*: this uniteth both, and beginning at the top of the *lambdoides*, reacheth sometimes to the nose.

The counterfeit, or *mendosa*, resemble a line only. The remarkable of these are the *squamosa*, or skale-like futures: these unite the bones of the tempils with those of the *vertex*, or top. They are two, one above each eare: they begin from the back-side, in the lower part of *processus mammillares*, and passe through the whole side of the skull. The common futures are those which belong to the skull, the wedge-like bone, and the upper jaw. The most remarkable are these: first, *frontalis*, by the which the outer proceffe of the *os frontis* is joyned with the first bone of the upper jaw. The second is *cuneiformis*, by the which the wedge-like bone, it being in the middle of it, is joyned with the first bone of the upper

upper jaw. The third is *cribrosa*: this is common to the wedge-like bone, and the *septum*, or partition of the nose. The sutures have three uses: the first is to stay the braine from tottering by staying of it, by sending some fibres from the *dura mater* through the sutures. The second, to breath out the vapour sent unto the braine from the lower parts. The third, to stay fractures from going further.

## CAP. V.

*Of the proper Bones of the head.*

THESE are in number six, one of the fore-head, another of the noddle, two of the crown, and two of the tempils. First, *os frontis*, the fore-head-bone: It is bounded by the coronall and first common future, before, and in the sides by the temporall bones. It is but one in those of ripe age, but double in children, being divided by

by a suture passing from the coronall to the nose. On each side of this bone in the upper part of the eie-browes, there is a large cavity and often two, from whence two holes passe to the hollownesse of the nose.

These cavities containe a clammy substance, kept in by a greene membrane. This receiveth the aire containing in it some odour received by the nose to stay it a while before it be sent to the braine. It hath two holes in the middle part of the eie-brow, which goe to the orbit of the eie; by the which, the first branch of the nerve of the third conjugation of the braine to the muscle of the forehead. It hath also foure processes; the greater two are seated about the greater corner of the eie, but the lesser two about the lesser corner.

The bones of the crowne are in number two: Before they are joyned with the bone of the forehead, by the coronall suture, with the noddle bone by the suture *lambdoides*:

*lambdoides*, to the tempil-bones, by the *sutura squamosa*, without they are smooth, but within unequal, by reason of the prints which the jugular veins of the *dura mater* leave.

Under these are the bones of the tempils. They are joyned with the bones of the crowne by the *sutura squamosa* in the sides; before with the first bone of the upper jaw by its first proceſſe, to the nowle-bone, by the counterfeit suture. These bones are thin in the upper part like a skale; but below thick, hard, and unequal, or rough, wherefore they are called *Petrosa*, rocky. In these are *meatus auditorii*, by the which the sounds passe to the braine. Of the furniture of this passage, peruse *lib. 3. cap. 23* of the inward parts of the eare. These bones have sundry holes for the letting of vessels to the braine.

The nowle-bone called *os occipitale* is joyned to the crowne-bones, by the suture *lambdoides*.

It is the thickest of all the bones of the head. It is smooth without; but hath sundry sinuosities to receive the meninges safely: through the great hole of this bone the *spinalis medulla* passeth to the back-bone.

These bones of the skull have two tables: The uppermost is hardest, thickest, and smoothest. The lower is unequall, and pitted to give way to the vessels dispersed through the *dura mater*. Between these two tables there is a certaine spongiouse substance, narrowe, and red, for the nutrition, and humectation of the bones. It is red, by reason of the small veins passing that way: this substance hath a threefold use: first, it receiveth blood for the nutrition of the skull. Secondly, in fractures of the skull, it causeth the *porus sarcodes* the sooner to grow. Thirdly, it furthereth the discharging of vapours from the braine.

## CAP. VI.

*Of the bones common to the skull  
and upper jaw.*

**H**itherto of the bones proper to the skull : Now follow those which are common to it and the upper jaw : these are three : First, the wedge-like bone, or *cuneiforme*; so called, not that it is like a wedge, but that it is seated in the middle of the bones of the skull and the upper jaw. Before it is joyned with the forehead bone, by a bastard, as also to the nowle-bone. At the sides it doth accompany a good way the *os petrosum*, from whence it is separate by a rough chink. Above, it doth touch the first, fourth, and sixth bone of the upper jaw; below it toucheth the bones of the palate of the mouth by the wing-like processes. It is thick and solid where it maketh the basis of the skull; it is the thickest of all the bones of the head.



head. Where there is a cavity, like to those above the eiebrowes, of the proecesses of it, within the skull, *Sella Turcica*, the Turkish Saddle is framed. In the middle of it the *glandula pituitaria*, which receiveth the pituitous excrements falling from the braine. Without the skull you shall finde one on each side, about the sides of the holes of the nose, like to the wings of a Bat; and from thence called *processus aliformes*. It hath sundry perforations, by the which the motorie and opticke nerves of the eie, and other nerves for the motion of other parts, as vessels, also veines and arteries for nourishment passe. The second common bone is *os cribiforme*, because like a sieve, it hath many holes: by these smells passe to the braine. A proecess like to the combe of a Cocke, and therefore called *crista galli*, divideth the upper part. Another thin bone lieth above to the instruments of smelling, and below to the nostrils, dividing the nose in two

parts, the right and left called *septrum nasi*. This bone giveth way to the discharging of the excrements of the braine.

The third common bone is *os jugale*, or the yoke-bone. It is placed on every side of the face betweene the cavity of the hearing and the first bone of the upper-jaw. It is framed of two bones: the hinder is a proceſſe of the temple-bone about the paſſage for hearing: the fore-bone is a proceſſe of the first bone of the upper jaw, which maketh the leſſer corner of the eye. Theſe two bones are joyned by an oblique ſuture, and make the yoke-bone; becauſe like a yoke it ſtayeth the ſides of the upper jaw. It ſtrengtheneth the tendon of the temporal muſcle which paſſeth to the lower jaw, and the muſcle *maſſeter*.

## CAP. VII.

## Of the jawes.

NOW follow the bones of the face; they are the jaw-bones, the teeth, and bone of the tongue. The jawes are two, the upper and lower. The substance of the upper jaw is not solid, but spongiouse, as the pumix stone; and unequall, because it is framed of sundry bones. They are sixe paire, sixe in each side. The first is *zygomatium*: It maketh up the best part of the yoake-bone, the outer corner of the eie, and a great part of the orbit of the eie. *Zygoma*, or the yoake-bone, is nothing else but a bonie halfe circle made of two processes: whereof the one proceedeth from the *os petrosum*; but the other is a portion of the cheek-bone. The second is *os lachrymale*, it is a round, little, and thin bone in the inner corner of the eie, whereon the *caruncula lachrymalis*

resteth. In the lower part of it there is a hole which passeth to the cavity of the nose : by this the third branch of the third pair of sinewes of the braine passeth to the inner membrane of the nose. The third is thin as the former; but quadrangular. It is joined with the bone of the forehead, and the wedge-like bone. The fourth is *os mala*, the cheek-bone, the greatest and thickest. This containeth all the upper teeth, and maketh up the holes of the nose, and most of those bones which belong to the upper part of the face. It is joynd above with the bone of the forehead, but below with the wedge-like bone; before with the *os lachrymale*, behinde with the third, and last of all with its fellow. The fifth is long, hard, reasonable thicke; it maketh up the bony part of the nose. It is joynd with the cartilages of the nose below; but to the internal proceſſe of the *os frontis* above. The sixth doth make up the rooſe of the mouth with its fellow.

fellow. Six bones then make up the orbit of the eye. The first is *Frontale*, which maketh the upper vaulted part. The second is placed in the outside where the lesser corner is, and is a portion of the wedge-like bone. The third maketh up the outside concurring with the former portion of the wedge-like bone. The fourth and fifth make up the inside. The sixth maketh up the lower part. These within the orbit are discerned partly by common, partly by proper sutures.

The lower jaw in those of ripe age is but one bone; but in beasts it is compacted of two bones. It resembleth the Greek letter *υ*, or a bow: that portion which pointeth out in the arched part is called the chin. At both the ends of it there are two processes whereof the one is sharpe, and is called *corone*: and receiveth the tendon of the temporall muscle. The other may be called *articularis*, because it serveth for articulation. Within this jaw there is a long cavity which ariseth

at the roots of these processes. By it the third branch of the third paire of sinewes of the braine, together with a veine and artery to the teeth. This may be found out by a small copper wire. This only is moveable, and both have sockets for the teeth, they are in number equall with the number of the teeth; they are enlarged by the teeth, and when in old age the teeth fall out the sockets draw together, and become sharp.

## CAP. VIII.

### *Of the Teeth.*

**T**He teeth are placed in the gummes. Their articulation is not uniform; for they are infixed into the gummes as a nail to a post by *gomphosis*. Their root is tyed to the mandible by a nerve, for steadinesse, by *synneurosis*; and the upper part compassed by the fleshy substance of the gumme, by *syssarcosis*. One

One thing is to be noted , That the Cutters and Dogges-teeth sometimes are implanted into the gummes by a crooked phang : whereby it falleth out , that when such teeth are drawn , the socket must be fractured.

Their substance is hardest of all other bones ; yet they do grow : for if a tooth in either gumme be drawn , the tooth opposite to it will in time fill up the vacuity left after the drawing of the other. Their figure representeth a naile ; for in the top they are flat , and in the root sharp. Towards the root they have a cavity compassed every way by a membrane , by the which they have an exquisite sense of feeling : the first qualities , heat and cold , much affect them , by reason of the membrane ; yet second qualities , as hardnesse and softnesse , do not offend them.

The teeth have veins from the jugulars ; arteries from the soporals , and nerves from the third conjugation. Seeing these vessels

proceed from the principall parts, the liver, heart, and brain: it is no wonder that children when they breed teeth are troubled with fevers, lasks, and convulsions, the principall parts be affected by consent.

As for the number of them, commonly there are found sixteen in each gumme. If there fall out any difference in individuall persons, it falleth out by reason of the *molars*.

There are three ranks of teeth: Those of the first rank are called *incisores*, Cutters. Most commonly foure are found in each jaw: they have but one phang, and so easily fall out. These first make way out of the gummes, because the tops of them are sharpest. Those in the second rank are called *canini*, or Dogges-teeth, from their length, hardnesse and sharpnesse above the rest. In each jaw there are two; at each side of the cutters one; they are called eye-teeth, not that they reach to the orbit of the eye; for they mount no higher than the nose.



noſethirles ; but becauſe ſprigs of the nerves, which move the eies are carried to them. Thoſe in the third ranke are called *molars*, grinders ; Becauſe as mills they grinde the meat. Moſt commonly they are twenty in number, five in each ſide of every jaw : Of theſe the foure next to the Dogge-teeth are perfected in the youth ; but the other two come not out untill the twenty eight, or thirty yeares, yea, ſometimes the old age it ſelfe come on. In ſome they never appeare. They are called the teeth of wiſdome. Theſe have more roots than the other. Thoſe of the upper jaw have more fanges than thoſe of the lower jaw ; firſt, becauſe they hang: ſecondly, becauſe the ſubſtance of the upper jaw is not ſo firme as that of the lower. The two of the upper jaw next to the *canini*, have two fanges, the reſt three. Thoſe next to the Dog-teeth in the lower jaw have but one fang and the reſt but two.

The uſe of the teeth is to chew  
the

the meat to prepare it for the stomacke to make a laudable *chylus*; wherefore the cutters pull the meat asunder; the Dog teeth brake it, and the grinders make it small, wherefore they are flat in the top, that they may receive and keepe the meat, and rough, that they may bruise it the better.

The teeth come out in man the seventh month, and sometimes more slowly, but in beasts sooner, because they are to eat solid meat. Of these teeth, ten in each gumme, to wit, the foure cutters, the two Dogges teeth, and foure grinders doe cast. The fore teeth cast the fourth, fifth, and sixth yeares of the age, the hinder slower.

## CAP. IX.

### *Of the Bone of the Tongue.*

THIS bone is seated under the lower jaw, in the uppermost part of the *Larynx*. It is like to the

the Greek vowell *υ*, or the lower jaw; because it is arched before, and spread like hornes behind. There are three parts of this bone. The first part upholdeth the tongue, which resteth upon the upper part of it, and is called *basis lingua*. The other two are laterall, and are called *cornua*, or hornes. These bones are tied to the adjacent parts, partly by a fleshy, partly by a nervous substance. This bone serveth to keep the throat open, that the meat may descend unto the stomack, and the aire have passage to the windpipe while we speak and breathe.

C A P. X.

*Of the bones of the Neck.*

**H**itherto then of the bones of the head, now follow the bones of the neck.

They are of two sorts, to wit, the *clavicula* or cannell bones, and the

the *vertebra*. They are called *clavicula*, because they represent the figure of keyes used in ancient times. They are like the great Roman S, for they seeme to bee framed of two semicircular bones; but placed one opposite to another. The substance of these bones is hollow; but more about the heads, and lesse about the middle. In number they are two, one on each side. Neere the throat they are round; but towards the shoulder flattish. They are tied to two bones, to wit, to the shoulder-blade, and the breast-bone. The use of them is to uphold the shoulder-blades, that they should not fall upon the brest together with the shoulder-bone; which falleth out when there is a fracture in them.

The *vertebra* of the neck are in number seven. The bones of these are harder than of the other, because they are more moved. These have first a large hollownesse to give way to the *spinalis medulla*:  
then

then two holes in the transverse processes one in each side, through which veines and arteries passe to the head. These *vertebra* being uppermost are lesser than the rest. They have processes oblique, transverse, and those behinde. These last are forked, if you except the first and last two. The first *vertebra* hath no sharpe corner, lest the two small muscles of the head, springing from the second *vertebra*, should be hurt when the the head is stretched out : upon this the head is moved forwards and backwards. The substance of this is harder, solider, and thinner than that of the rest, because it is the least, and the cavity of it is biggest. The *sinus* of it which receiveth the tooth-like proceffe, is garnished with a cartilage round, where the proceffe is. Here the head is turned round. As for the second, out of the middle of it the tooth-like proceffe doth spring long and round. It is joy-ned with the first *vertebra* by a broad

broad ligament compassing it. If a luxation happen here, it is deadly. The foure that lie under these in all things are like the rest : their laterall processes are large, and parted as the sharpe corners, to receive the more muscles. The seventh is the largest of all. It is like to the *vertebra* of the brest ; for it hath neither transverse processes, neither is the hindermost forked.

## C A P. XI.

### *Of the vertebra of the brest.*

**T**H E bones of the brest are the *vertebra*, the ribs, and brest-bone : As for the *vertebra*, they are twelve in number, unto which so many ribs answer ; whereof seldome doth one abound, more seldome lack. Their bodies are round in the fore-part ; but behinde somewhat hollow. As for processes, they have foure oblique, serving

erving for strong articulation, two laterall, and one sharpe behind, not divided. They have two hollowneses, on each side one, lined with a cartilage to receive the tops of the ribs. As for holes, they have one large in the middle, which containeth the marrowy substance, and two lesser, besides on each side one.

One thing is to be noted, that the twelfth *vertebra* is not joyned as the rest by *gynglymos*, but by *arthrodia*. Wherefore extending, bending, and turning are performed by this *vertebra*.

## CAP. XII.

### Of the Ribs.

THE ribs are twelve in number  
 Their substance is partly bony, partly cartilaginous; the first serving for firmnesse, the second for articulation. The bony substance towards the *vertebra* is thick

thick and roundish, but towards the *sternum* flat and thin. The cartilages in bignesse answer the bignesse of the ribbes: for the bigger ribs have the bigger cartilages, and by the contrary. The ribs in the upper part are blunt, but in the under sharper. In the lower part they are grouped to receive the intercostall vessels, the veins, arteries, and nerves.

These ribs are of two sorts; for they are either long or short: the long reach to the breast-bone, and cause a circle: they are seven in number. These are articulate with the breast-bone by *arthrodia*; for in the breast-bone there are sundry cavities, which receive the cartilaginous tops of them. To the *vertebra* they are joyned, their ends cartilaginous being received in the hollownesse of the *vertebra*, and are strengthened by ligaments.

The short are semicircular; without, arched; within hollow. The uppermost and lowermost are shortest, but the middle longest.

These



These in the forepart bend upwards, and are joynd to themselves, and the cartilages of the long ribs, if you except the twelfth. In the hinder part they are articulate and strengthened as the long; but the eleventh and twelfth stick in the *vertebra* by one top onely. The use of the ribs is; first to be a defense to the heart and lungs; secondly, to further the motion of the brest; for they strengthen the fleshy parts.

---

### C A P. XIII.

#### *Of the Brest-bone.*

**T**His is not one entire bone, but is framed of three; whereof the uppermost and lowermost are alike in all ages, and but one. The second in infants is composed of three bones, which become one, the seventh yeere of the age being expired. In children all these bones are gristly, but afterward become bony:

bony : In aged persons it seemeth one bone, yet it is distinguished by three transverse lines, shewing the first division, which are more conspicuous in the inside than outside. These bones are of a red fungous substance, full of small holes : the upper part is more hard than the lower.

The upper bone is thickest and broadest ; it hath in each side a long cavity, lined with a cartilage to receive the points of the cannell bones ; between these is a pit called *jugulum*. The second bone is neither so thick nor broad, yet foure times as long ; it receiveth in its cavities the cartilages of the third, fourth, fifth, and sixth ribs. The third is least of all, yet it is broader than the second, unto the lower part of which it is joyned. To the end of this is annexed the cartilage called *mucronata*, or *ensiformis*, or sword-like : but the whole breast-bone compacted of three bones doth resemble the handle of a sword, which in ancient times was used.

used, being half-moon-like in each side. Under this is the pit of the stomach, where the upper and left orifice of it is, called *scrobiculus cordis*. The Ancients called this orifice *cor*, or heart, because the pains of it are like the pains of the heart, and called *cardialgie*.

# C A P. XIV.

## Of the vertebræ of the Loins.

THE bones belonging to the lower belly are these; five *vertebræ*, *os sacrum*, *os coccygis*, and *os ischii*. The *vertebræ* of the loins are in number five; they are larger than those of the breast, because they uphold them; and the lowermost of them are biggest. They are long and semicircular: their substance is spongy, like a pumick stone, and full of holes, to give way to the veins. They have one large hole, to give way to the *spinalis medulla*; and two small, by the

the which nerves passe to the adjacent parts, and veins and arteries come in. As for the processes, the upper and lower differ from those of the brest: for in those the upper parts were knobby, but the lower hollow; but in these the contrary is scene; for the upper parts are hollow, and the lower knobby. The transverse are long and small. The hindermost are short and strong. In the backpart of these there is a rough hollownesse to receive *os ilium*.

## C A P. XV.

*Of the os sacrum, and rump-bone.*

**I**T is so called from the bignesse. The Latines imitating the Greekes called things large *sacra*. This is the broadest of all the bones of the back, and doth uphold the whole frame of the *vertebre*. In infants it is composed of five bones, most commonly united by

by a cartilage ; but in men of ripe age it seemeth but one bone. These bones are *vertebra* , for each of them hath a body and proccesses, and hath a large hole to receive the *spinalis medulla*. In this these differ from the other *vertebra*, because in those the lower part is bigger, but in these lesser; wherefore the uppermost is the biggest, and the lowest the least. These have a large hole to receive the *spinalis medulla* , and other lesser framed of the union of the *sinus* to send out nerves. As for the proccesses, the oblique can hardly be discerned but in the first. The transverse are long, so united that all seeme but one. The upper part is thickest ; the hindermost are like the *spina* of the loynes, but lesse, and the lower the lesser; in so much that the lowermost hath no proccess, but a round bunching out.

To the *os sacrum* the rump-bone is joyned by a cartilage : for the first bone of it hath a small hollownesse

lownesse which receiveth the last *vertebra* of *os sacrum*. It is called *os coccygis*, the Cuckoës bill, from the likenesse of it. It is framed for the most part of three bones, whereof the lower is still lesser. In men it is bent inward to stay the straight gut, and the sphincter muscle which are tyed to it ; but in women outward to give way to the matrix in the time of birth. The bones of this are spongius and soft, and have neither processe nor any hollownesse. Their uniti-on with the *os sacrum*, is loose to give way to great excrements when they come out ; for otherwise a luxation might be procured as in hard labour sometimes it falleth out.

## CAP. XVI.

*Of the Hoop-bone.*

**T**His bone is called *os innominatum*, or without any proper name

name by some ; but by the most learned *os ischii*. I have termed it the hoope-bone, partly because it strengthneth the *os sacrum*, upon which all the *vertebra* of the back doe rest. Partly because the motion of the inferior bones are ruled by the muscles which spring from this bone. In children it appeareth framed of three bones, joyned by a cartilage, untill the seventh yeer; but in men of ripe age these three, the cartilage being dried, seem but one entire bone. The first is called *os ilium*, the huckle-bone, because under it lyeth the small gut called *ilium*. This is the broadest, and greatest in figure, semicircular, arched without, within hollow. The semicircle is called *spina*, the arched part *dorsum*, the hollow part *costa*. It is joyned with the *os sacrum*, and this to it, by mutuall processes and cavities. The second is called *os coxendicis*, or the hip-bone. This being placed betweene the huckle and share-bones, receiveth in its cavity the thigh-

T

bone.

bone. This cavity is large, and hath brimmes, and is covered with a cartilage. The third bone is *os pubis*, and *pectinis*, or the share-bone; it is seated in the fore-part, in the middle it is parted by a cartilage not very hard. These three bones, together with the *os sacrum*, make that cavity which is called *Pelvis*, which is bigger in a woman than in a man; in it are contained the guts, bladder, and part of the *matrix*; wherefore it is a shield for them. In hard labour the share-bones and the *os sacrum* will part, the cartilages and ligaments, being bedewed with superfluous humidity, giving way.

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### C A P. XVII.

#### *Of the shoulder-blade.*

**N**O W follow the bones of the *limmes*, which are legs and armes. The bones of the armes are either above the joynt of the shoulder, or under. Above the joynt



joynt lyeth the shoulder-blade. The substance of it is for the most part hard and solid; the outside is somewhat arched, but the inside hollow, it seemeth triangular. It is joynted to sundry parts by *syssar-cosis*, or concarnation, by means of the muscles. It is joynted with the nowle bone by the cucullar muscles; to the *vertebra* of the necke by the second paire of them; to the back by the muscle *rhomboides*. The broad end is called *acromium*; the other end under this, narrow and thick, is called *cervix*. Here is the anchor-like proccesse, which hindereth dislocation that way: wherefore seldome is the *adjutorium* put out forward. In the inside of this bone about the middle there is a hole, by the which a vein doth passe for nourishment of it. The shoulder-blade hath a thriefold. First, it receiveth the *adjutorium*, and maketh the articulation called *arthrodia*. The cavity of the shoulder-blade which receiveth the

*adjutorium* is shallow, that the arme might readily every way. This holownesse is recompensed three manner of waies; first, by a strong ligament, which compasseth the joynt: Secondly, by the tendons of three muscles, *supraspinatus*, *infraspinatus*, and *subscapularis*, doing the same. Thirdly, by a cartilage which cleaveth orbicularly to the ligament, but not to the hollownesse. Secondly, sundry muscles spring from the shoulder-blade. Thirdly, it defendeth the back from being hurt.

## CAP. XVIII.

*Of the shoulder-bone.*

**N**OW the bones of the arme, under the joynt are three; the shoulder-bone, the elbow-bones, and the bones of the hand. The shoulder bone is of a hard and solid substance: it is hollow all alongst like a whistle, wherein a marrowy

marrowy substance is contained. At the two ends it is broad, but round in the middle. In the top of it there is a long chinke through w<sup>ch</sup> the nervous head of the *musculus biceps* doth passe. In the lower end you shall observe the pulley, about the which the *ulna* is turned, which is in the inner knob; to the outer knob which is covered with a cartilage the *radius* is joyned. At the sides of these are two small knobs, from whence muscles spring. About the middle of this bone in the inside, you may perceive a hole through the which a vessell doth passe to the marrowy substance for nourishment.

## CAP. XIX.

*Of the Elbow bones.*

THESE are in number two; to wit, the lesser above called *radius*, and the larger below called *ulna*. Their substance is firme

and solid, if you except the additaments of them. Both of them are long, and containe a marrowy substance : they are somewhat rough, by reason of the lines appointed for the muscles.

The *ulna* is large above, lesser below : it serveth for the stretching out and bending of the arme, and so it is articulate by *gynglymos*; but the *radius* is lesser above, but longer below, to receive the bones of the wrist : it is joyned by *arthrodia*, and serveth for the turning up and downe of the hand. The *radius* above is received by the *ulna* ; but below the *ulna* is received by the *radius*. They are joyned together by a long ligament, which serveth the internall muscles from the externall. The semicircular knob in the hinder part of the *ulna* is called by *Hippocrates ancon*, by *Galen*, *olecranon*. These two bones part about the middle ; partly that the *radius* might the more easily performe its semicircular motion, partly to receive the muscles.

CAP.

## CAP. XX.

*Of the bones of the Hand*

THE hand is divided into three parts: the wrist, called *carpus*; the distance between the wrist and fingers, called *metacarpus*; and the row of fingers.

The bones of the wrist are eight in number, whereof there are two orders: the upper hath three bones so joyned together, that they seeme one; the fourth is the least of all, and placed under the little finger. The inferior hath foure bones; they are joyned together by *harmonia*, because their motion is obscure. The upper rank is joyned with the lower part of the *ulna* by *arthrodia diarthrodes*; but the lower with the *metacarpus*, by *arthrodia synarthrodes*.

One thing is to be noted, that the annular ligament doth compass the wrist, and comprehendeth the tendons, which passe

T 4 through

through the cavity of the *carpus*.

*Metacarpus* hath foure bones; they are of a solid substance, hollow and round, bigger than those of the fingers: that which answereth the pointing finger is biggest, and so still the lowermost are lesser. Between each two a distance is left for the *musculi interossei* of the fingers. Above and beneath they have an appendix; by the upper they are joynted to the wrist, by the lower to the fingers; the upper hath a cavity, but the lower a round long top, covered with a cartilage.

In the palme of the hand there is a transverse ligament, the which doth tie the bones of the fingers to the *metacarpium*. The thumb hath no connexion with the bones of the *metacarpium*. First, because it is articulate with the wrist by *diarthrosis arthroidalis*, and hath a manifest motion; but the bones of the *metacarpus* are joynted to the wrist by *synarthrosis*, and have no manifest motion.

Secondly,

Secondly, because the upper of the thumb is shorter than the bones of the *metacarpium*, and not answerable to them.

As for the fingers, each of them hath three bones, each of them answering a bone of the *metacarpus*, the thumb excepted; their upper additaments have sinuosities, but the lower knobs. These bones are joyned by *gynglymus*, and so they onely stretch themselves out, and pul themselves in. As for their obliquation, it doth depend upon the *enarthrosis* of the first bone with the *metacarpus*. Besides these bones in the inside of the hand, some small bones called from their figure *sesamoidea*, like the seeds of *sesamum*, or oylie pulse, or Turkey millet: they resemble the kneepan, and seeme to serve for the same use; for in strong extensions they strengthen the tendons. In the second joynt of the thumb there are two. The second and third joynt of the fore-finger have each one, the rest have two in the first

joynt. In children they are of a cartilaginous substance.

## C A P. XXI.

### *Of the Thigh-bone.*

THE leg is divided into three parts, the thigh, the shank, and foot. The thigh hath but one bone, but of all others it is the biggest: the two ends of this are to be noted. In the upper part there is a round head; the slender part under it is called the neck; it is long and oblique; for if it were straight it would cause halting by pressing down the groyne. A strong ligament doth keepe in the head within the hollownesse of the *Ischium*. If this ligament be relayed or torn, it causeth halting. From the neck spring two prominences: and because the muscles called *rotatores* are fastned to them, they are called *trochanteres*. The hindermost is the lesser trochanter;



chanter; but the laterall or uppermost the bigger. The lower end of the thigh-bone hath two flat and low prominences, leaving a cavity in the middle, which receiveth the *apophysis* of the *tibia*. And againe these prominences are received by the cavities of the *tibia*, by a loose *gynglymus*. The upper part of this articulation is called the knee, the hindermost the ham. Above the knee appeareth a bone, not joyned with any other bone, called the pan, or *patella*: it is somewhat round, about two inches broad, plaine without having many holes, but within bunched, covered with a cartilage. It is set before the thigh-bone and the *tibia*, to strength the articulation, for otherwise the thigh-bone would slip out forward in going down any hill. It cleaveth to the knee by the thick tendons of the second, third, and fourth muscles which extend the *tibia*, and passe by the knee to it, and are implanted into the fore knob of it. Two ligaments

ligaments fasten the articulation of the thigh-bone with the *tibia*: the one is circular compassing both, the other is long, placed between the two bones, reddish, by reason of the veines there. Behind there are two seed-bones, tyed to the two beginnings of the first muscle which moveth the foot to strengthen them. Great wounds of the ham are mortall, by reason of the great vessels which passe that way.

## CAP. XXII.

*Of the two bones of the shank.*

THE shanke is composed of two bones. The greater is called *tibia*, the lesser *fibula*. In the upper part it hath a proesse, which is received by the hollownesse of the thigh-bone. It hath also two long cavities for the receiving of the two prominences of the thigh-bone. To help the shallownesse

lownesse of these cavities, there is joyned by ligaments a moveable cartilage, soft, slippery, and bedewed with an unctuous humour, which being thick, becommeth thinner towards the center: it is called *cartilago lunata*, the Moon-like cartilage. It is joyned to the thigh-bone by *gynglymus*. The *fibula* onely cleaveth to the *tibia*, and toucheth not the thigh-bone. The *tibia* causeth the internall ankley. About the middle it hath a conspicuous hole to let in a veine for nourishment. This bone is triangular, having three lines; the sharpest before is called *spina*; of the posterior the inward is blunt; but the outward somewhat sharp. The *fibula* is a firme bone also, and is three-square likewise, one line is before, and two behinde; the upper end hath a hollownesse covered with a cartilage in the inner side, which receiveth the laterall knob which is under the appendix in the upper end of the *tibia*, the lower end maketh the outer ankley.

## CAP. XVIII.

## Of the bones of the Tarsus.

OF the foot as of the hands there are three parts, *tarsus*, *metatarsus*, and the toes. The *tarsus* is the distance between the lower end of the two *focils*, and the beginning of the five bones which are articulate with the toes: It hath seven bones; the first is *talus*, or the game bone; the great and small *focill* are joyned with it, and so the foot is stretched out, and drawne in, as also moved to the other side; all beasts with a cloven foot have this bone. In the upper part it is articulate with the *tibia* by *gynglymus*, and so below with the heel-bone. The second is called *disos*, the heel-bone under the *talus*; this receiveth the great tendon called *neruus Hectorius*, composed of the tendons of three muscles of the shank. Above it receiveth the *talus*, below it is received by *os cubiforme*.

*cubiforme*. The third is called *naviculare*, from its figure ; for it is long, without bunched, but within hollow, being covered with a cartilage, where it receiveth the end of *stalus*. The fourth is called *cuboides* ; because it hath sixe sides, representing a *cubus*. In the forepart it is joyned to the fourth and fifth bone of the *metatarsus* ; in the hinder with the heele-bone ; but in the inside, it, with the rest of the sides are joyned with no bones, but are free. The three ensuing are called *cuneiformia*, or wedge-like bones ; for above they are broad, but below they are narrow ; being joyned, they represent a vault : for above they are arched, but under hollow, to receive the tendons and muscles, and not to touch the ground, for that the *cuboides* only doth. The first of those bones is the greatest, wedge-like, seated in the inside of the foot. The second is the least, placed in the middle. The third is that which is meane, between both in bignesse. These  
three

three are joyned with the boot-like bone, or *os naviculare*.

## CAP. XXIV.

*Of the rest of the Bones of the Foot.*

**T**He *Metatarsus*, or instep, hath five bones; for one is appointed for the stay of the great toe, which is not in the hand.

They are solid without, hollow within, longer than the bones of the back of the hand. That which stayeth the thumb is thickest, the longest is that which stayeth the next toe: and although all the rest of the toes are of an equall thicknesse, yet the uppermost are longer than the lowermost: the lowermost parts are inserted into the hollownesse of the first joynts of the toes; but the uppermost ends are received by the bones of the *tarsus*. That which stayeth the thumb is received by *cuneiforme majus*: the second by *cuneiforme minus*: the third by the third wedge-like bone: the other two by the two tops of *os cubiforme*. The

The bones of the toes are in number fourteen; for the great toe hath only two, but the rest three. These bones are solid without, and hollow within; they have three joynts, and two processes: the lowermost hath two knobs, received by the top of the lower, but the uppermost receiveth: the uppermost joynts have a deeper hollownesse, because they receive the ends of the bones of the instep. The seed-like bones are seated as they are in the hand, two are in the second joynt of the thumbe, which strengthen the tendon of the muscle which bendeth it.

## CAP. XXV.

*Containing an Explication of some  
termes which are found in Ana-  
tomicall Authors in the  
Doctrin of Bones.*

**C**otulae are termed deepe cavities in the articulation of the bones.

*Glena,*

- 2 *Glæna*, or *glenoides* are shallow cavities.
- 3 *Epiphysis*, or *appendix* is called a bone which groweth to the end of another bone. It is of a spongi-ous substance, at the first gristly, but afterward becommeth bony; it may be seen in both the focils of the legs at both the ends.
- 4 *Apophysis*, or *tuberculum* is a part of a bone not added, but bunching out above the smooth superficies, if it be sharp, it is called *spina*.
- 5 *Condylus*, is a low prominence, and flat.
- 6 *Corone* is a sharp prominence.
- 7 *Supercilia*, or *labra*, are the upper brimmes of the cavities of the joynts.

## CAP. XXVI.

*Of the number of the Bones.*

**I**N Ancient times they were holden to be 246. according to this distich:

*Addē*



*Addes quater denis bis centum sena q<sup>3</sup>  
habebis*

*Quam te multiplici condidit offe  
Deus.*

But the diligence of late Ana-  
tomists have found out more.

Thus then they may be summed :

The head hath	8
The upper jaw	11
The lower jaw	1
The teeth are 32. sometimes	28
The <i>spina</i> hath	24
The <i>os sacrum</i>	9
The ribs are	24
The brest-bone 1, but compo- sed of	3
The Cannel-bones	2
The shoulder-blades	2
Of the <i>Ischium</i>	3
In the armes	60
In the feet	64
The bones of the eares	6
The great seed-like bones of the great toes.	4

If with some Anatomists you  
reckon 24 seed-like small bones in  
the two hands, and so many in the  
two feet, and two in each ham,  
and

and the eight bones in each hand, betweene the *carpus* and *metacarpium*, and the bony substance annexed to the *cuboides* in both the feet in old persons you shall have 54 more, which being joyned to 246, make up 302 expressed thus:  
*Tercentum & binis compactum est ossibus istud,*

*Quod gerimus corpus : non est quod plura requiras.*

If thou 302 bones chance to finde,  
 Few or none are left behinde.

## CAP. XXVII.

### Of a Cartilage.

The Description,

**A** Cartilage is a similiary part, dry and hard, yet not so as a bone; flexible, which a bone is not; framed to stay the soft parts, and to repell the injuries of external hard bodies. 1. Then it stayeth the soft parts. 2. It defendeth them. 3. They cover the ends of the bones, which have a loose articulation. 4. They knit bones together : as is scene in the share-bone.

The

The differences are taken first, from the figure; so the cartilage of the breast-bone is called *ensiformis*, and those of the *Larynx sigmoides* like C. Secondly, some are solitary, not joyned with other bodies, as those of the eares and eye-lids: some are joyned, as most of the rest. Thirdly, some still continue cartilages, some degenerate into bones, as in women, the cartilages of the ribs, which lye under the breasts: for these growing very big, they become bony, the better to hold them up. They are in sundry parts of the body. 1. In the head there are foure, to wit, of the eye-lids, nose, and eares; and the *trochlea* of the eye. 2. In the breast there be three, to wit, the cartilages of the *larynx*: the small pipes of the winde-pipe, dispersed through the lungs, and *cartilago ensiformis*. 3. The long ribs are joyned to the *sternum* by cartilages. 4. The *vertebrae* of the back are joyned together by cartilages. Last of all sundry are seene in the articulations, which

which are loose, and in the conjunction of bones.

# CAP. XXVIII.

## *Of a Ligament.*

**A** Ligament is a similiary part without feeling, in substance meane betweene a cartilage and a membrane, appointed firmly to knit the joynts.

Of the ligaments some are membranous (such are those which environ the joynts;) some cartilaginous, as those which are betweene the joynts, as is seene in in the articulation of the thigh-bone with the *coxendix*.

Ligaments are to be found in divers parts of the body. First, the bone of the tongue hath two strong ligaments, one on each side. Besides, on each side it hath round ones by the which it is tyed to the adjacent parts, to stay it in the middle of the mouth. Secondly, the tongue hath a strong membranous ligament in the lower part about the middle of it. About the end of

it the *frænum* is to be seen, which if it come to the fore-teeth, it hindereth the motion of the tongue and speech. Children being so troubled, are said to be tongue-tyed, and must have it cut. Thirdly, the ligaments which tye the *vertebra* of the brest and loynes, the ribs with the *vertebra*, and the ribs with the brest-bone, are membranous. Fourthly, sundry are to be seen in the belly. The first tyeth the *os ilium* to *os sacrum* the second tyeth the *os sacrum* to the *coxendix*: The third joyneth the share-bones, and is cartilaginous. The fourth compasseth them circularly, and is membranous. The fifth compasseth the hole of *os pubis*, and is membranous. Fifthly, in the arme these appear. 1. Five tye the *adjutorium* to the shoulder-blade. 2. The bones of the elbow, *ulna* and *radius*, are tyed first one to another; secondly, to the shoulder-bone; and thirdly, to the wrist, by membranous ligaments. 3. There are two annular ligaments, which being transverse, direct

direct the tendons which passe to the fingers, they are two; one in the outside for the tendons of the extending muscles; the other in the inner side, for the tendons of the contracting muscles. 4. The bones of the wrist, back of the hand, and fingers, have membranous ligaments. 5. In the leg these may be found out.

First, the thigh-bone is tyed to the *Coxendix*, by two ligaments.

Secondly, the lower end of it is tyed to *Tibia* and *Fibula* by six ligaments.

Thirdly, the *Tibia* is joyned to the *Fibula*, by a membranous ligament.

Fourthly, *tibia* and *fibula* are joyned to the ankley by three ligaments.

Fifthly, the ankley is tyed with the bones of the foot by five ligaments.

Sixthly, the bones of the instep and toes are tyed with such ligaments as those are which are seen in the hand.

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